



FRIDAY, DEC. 11.

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Contributions.

Testing M. C. B. Couplers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The development and value of couplers might be speedily ascertained in the following manner, and in short time, by taking a pile driver or by the use of two railroad rails secured at each end with a tie bar with a space of 2 ft. between rails, and stand the frame on end, secured in an upright position by means of guy ropes, the upper end to be provided with a sheave, over which a rope may run, secured to a coupler and carriage to serve as the drop hammer upon a coupler of the same kind secured in the base of the frame upon a standard spring. In this way a test parallel to car service shocks can be made, and the facts established as to the coupler or couplers standing the greatest number of blows without injury to any of the parts. Then put the same number of couplers through a series of pulling tests to ascertain their relative value in regard to the strength of the knuckles and the locks. These facts having been brought out, the only other features to be then determined will be that of the best protected locks, the most convenient method of uncoupling devices, and where located to be the least hazardous to injury in general service, and, if injured at all, whether such injury will cause the same to be inoperative or not. It is well known that a great number of the uncoupling devices now in use, if bent slightly, are at once made inoperative.

It might be said that the universal adoption of the survival of the fittest in such a test cannot be brought about on account of injury to established manufactures. This no doubt would be true under the laws of self and self only, but suppose the company or inventor having the winning coupler would license all other factories established to manufacture the coupler according to specifications and plans furnished alike to all. The result would be cheaper couplers and the improvement in material, in order that each producer might get the greater number of orders to fill. Hence, uniformity.

To say more would be useless. Merits alone should settle the coupler problem. Legislation should not be in it, as it will only prove a barrier to the requisite essentials justifying the railroad companies to unite in a concerted action in selecting the best.

A. W. VAN DORSTON, M. E.

Tail Lights and Collisions.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The articles in your issue of the 4th inst. upon "Tail Lights and Collisions" recall some work done two years ago in an effort to provide a better safeguard against following trains, and as the subject is growing daily more important, and no one has any hope of discovering "the third color that we are waiting for," it may be wise to outline the work then done. The design was based upon the assumptions:

1st, That a preceding train would under ordinary circumstances be safe if the following engineman were advised in time of the rate of speed of the train in front, and

2d, That an inexpensive automatic speed indicator operated by the axle of the caboose, would under all circumstances be better than any signal dependent alone upon the presence and alertness of a rear watchman.

I found in the records of invention and of the Patent Office numerous ingenious and simple devices by which a few rods, a couple of gear wheels and a ball governor were made to give indications at the top of the car of speed either, 1st, by revolving a half-sphere about a red light, so that the frequency of the appearances and disappearances of the light would show the speed of the train—which was a useless device, since the train might

come to a halt with the shield entirely cutting off light in the rear—or, 2d, by having a screen with a red light above a green light in a standard so that a train at rest would show a red light only (in addition to the usual tail lights), but a train at speed would have the screen raised by the ball governor so as to show only the green light—which appeared to be an efficient signal except that it gave poor indications of the rate of speed, which it is most important to know.

I therefore applied this latter operating gear to a parabolic illuminated arm, which with a train at rest would show a horizontal red arm, and with a train at full speed would show a red arm inclined at, say, 60°, and at intermediate speeds would show a red arm at intermediate inclinations.

The arm would be always red, because a preceding train is always a source of danger, and there should be no feeling of security such as would be given by a green or white light. The arm was intended as a speed indicator only, and to be used in addition to such tail lights as might be considered necessary. The signal being double will give indications at either end of the caboose, and by a small addition may be made to show the direction of motion (forward or backward) as well as the speed. The mechanism is very simple, the device is not patented, and I cannot but regard it as simpler and better than any multiplication of lights used to produce a "form" signal.

C. HERSCHEL KOYL.

The Works of the New York Air Brake Company.

The fact that this company has now entered into serious competition with the Westinghouse Company makes it of interest to know somewhat accurately what its present facilities are for making brake equipment. As is well known, the works of the company are at Watertown, N. Y. This situation has the obvious disadvantage of being off the main routes of travel and remote from any of the great railroad centres. It has, however, certain advantages, and they are such that there is no present prospect of the air brake works being removed. The obvious great advantage is in the magnificent water power of the Black River. Besides that, living is comparatively cheap, and the men are contented, and labor troubles are very rare. Land, of course, is also cheap, and workmen find it possible to own their own homes.

The works of the New York Air Brake Co., and of the Eames Vacuum Brake Co., are on an island in the Black River. The area of this island is about five acres, of which about three acres is occupied by the existing shops. The rest of the island has been recently purchased by the New York Air Brake Co., and a foundry will be at once built upon it. The waterpower will also be further developed by the Air Brake Co. for various purposes not connected with their own business. The available water power on both sides of the island is estimated at about 2,000 H. P., and is never failing. The company now has six turbines, which supply the power for running the machinery of the works and also for an electric street railroad which is now operating for six miles. Steam is considerably used for pumping air for various purposes of the brake works, and to some extent for operating the power hammers in the blacksmith shop, although these are also operated by air, compressed by water.

The shops are arranged in a quadrangle, two sides of which are occupied by the old buildings of the Eames Vacuum Brake Co. These are now used for the vacuum brake work, for driver brakes, engine pumps and for assembling the work. The brass foundry is also in one of these old buildings. On another side of the quadrangle is a new blacksmith shop, and the fourth side is occupied by a large new brick building for the compressed air brake work. This shop is entirely modern in its arrangement and equipment. It contains the best special tools for air brake work. It was fitted up under the supervision of Mr. Wm. D. Turner, the General Manager at the works who was for fifteen years with the Brown & Sharpe Manufacturing Co. and is thoroughly conversant with modern machine tools as well as with the best shop practice. In this building will be found tools for boring and finishing brake cylinders and for all the fine work of the triple valves, engineer's valves and other parts of the air brake mechanism; and there are no better tools made than these. There is also a testing rack for 50 sets of brake equipment with all the piping and hose connections for a 50 car train.

The present capacity of the works is 75 sets of car equipments and seven sets of locomotive equipments, including driver brakes, per day, and by Jan. 1 the capacity will be increased to 100 sets of car equipments per day. The only thing lacking to complete the works is an increased iron foundry capacity. At present the company is obliged to procure a portion of its castings from outside foundries, but a new foundry of dimensions 150 ft. x 300 ft. will be at once built on the portion of the island recently purchased. The works are under the direct charge of Mr. Wm. D. Turner, Mr. A. P. Massey being Mechanical Engineer of the company and Mr. H. G. Manning Superintendent. At present 575 men are constantly employed.

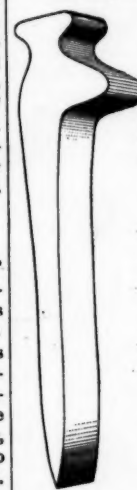
Every opportunity is given to visitors to see shop tests of air brake equipment for any number of sets up to 50, and the Westinghouse valve is mixed in with the New York Air Brake Co.'s valve in any position or numbers desired, so as to demonstrate, so far as shop tests can, the perfect interchangeability of the two systems. On one

end of the pipe circuit is a New York engineer's valve and on the other the Westinghouse engineer's valve, so that the operation of the two can be shown.

Of course it would be out of place to express any opinion as to the relative merits of the two systems or as to the questions of patent rights. We can only say that so far as the mechanism of the triple valve and engineer's valve goes, and so far as the shop tests indicate, the New York Co.'s system is entirely satisfactory. The application and release of the brakes with and without the Westinghouse valves seems to leave nothing to be desired. Experience alone can settle the questions of relative wear and performance in service.

The Greer Track Spike.

Some very interesting experiments were recently made in English and American laboratories on the holding power of various spikes in different classes of railroad ties. The results of these tests show comparisons between the "Greer" and some familiar forms of track spikes.



The problem presented in making a spike is that it shall cut the fibre of the wood cleanly, leaving a perfect, unbroken wall of solid wood in front and back of the spike, so as to not only increase the holding power of the spike and thus secure the close contact of the rail with the tie, but also to offer all possible resistance to the tendency toward widening the gauge under traffic. The fibres of the spike should be such, that while being driven it will keep close to the edge of the rail and obviate the necessity for the side blow of the maul, to bring the head over to the rail flange.

The "Greer" spike, of which we give an illustration, being rolled in plates (the cross section of which is that of the longitudinal section of the spike) gets rid of that deformation of the metal incident to forming the head of the ordinary spike. In this way also a smooth finish is obtainable when the plates are cut up into spikes. These spikes are drawn with an ordinary claw worked from the side, resting the heel on the flange of the rail, which gives an excellent leverage, as it is much firmer than where the tie is used as a fulcrum.

The first of the tests alluded to was of standard 5½ x 1½ in. square spikes as against the "Greer" spike. Some of each kind were driven into a tie, placed alternately and spaced eight inches, and then drawn perpendicularly with a machine, registering the amount of the pull. The pull necessary to draw 100 Greer spikes was 231,750 lbs., and for 100 standard spikes 132,710 lbs., showing a decided advantage for the former of about 990 lbs. per spike. This test was made with cedar ties.

The second series was made in the C. & N. W. laboratory, and resulted as follows: Average of four tests for the "Greer" 3,372 lbs. and for the standard 6,232 lbs., in oak ties, equal to 2,120 lbs. per spike in favor of the former. For cedar ties these averages were 3,902 and 1,672 respectively.

The third series was made by Thomas Nash at his laboratory at Sheffield, England. The ties used were not treated (neither burnitized nor creosoted). The dimensions of the English spikes are ¾ in. square and 4½ in. long; those of the "Greer" ½ in. x ½ in. x 4½ in. long. Six tests showed as follows:

	Total pull.	
	Baltic pine ties.	English elm ties.
Greer spike.....	2,335 lbs.	38,850 lbs.
English standard, 5½ x 1½.....	11,230 "	35,360 "

With the Baltic pine ties (which are about equal in quality to the American pine) the advantage is 1,950 lbs. per spike, and with the English elm ties (which are somewhat inferior to the American oak) this advantage was 3,920 lbs. per spike.

The great advantage of this spike in service or in such tests as these is in the fact that it has a sharp edge and cuts the fibres of the wood as it is driven, allowing their separated ends to impinge closely against the sides of the spike, and as these fibres are slightly bent down, their points get a firmer grip on the spike, tending to hold it in position. Whereas the noticeable disadvantage of the standard track spike is in its pushing its way through the wood fibres, displacing and breaking them off, reducing their holding power very materially at first, and in an increasing amount as the moisture enters around the spike and rots away the wood, as will rapidly take place, being hastened by the open and torn condition of the fibres.

As illustrating the better holding power of this sharpened spike for preventing the spreading of the rails, two rails were spiked down to ties, one with standard spikes and the other with rolled spikes, and a screw jack tightened up between them, the two ends of the jack being pointed and bearing against metal blocks, which were shaped out to fit the neck of the rail, thus giving an equal thrust on each rail. As might be expected, the "Greer" spikes held firmly so as to crowd the others out.

The figures above quoted are taken from a small book recently issued by Messrs. Morris Sellers & Co., who control this spike for this country.

Tests of Baldwin Ten-Wheeler on the Baltimore & Ohio Road.

CONCLUDED FROM PAGE 833.

II.

DESCRIPTION OF TRAINS HAULED AND GENERAL RESULTS.

First Train.—On the afternoon of May 9 at 5:36 p. m. the engine (No. 1,304) started from the yards at Piedmont with five cars of coal weighing all told 206,200 lbs., or 148.1 tons.

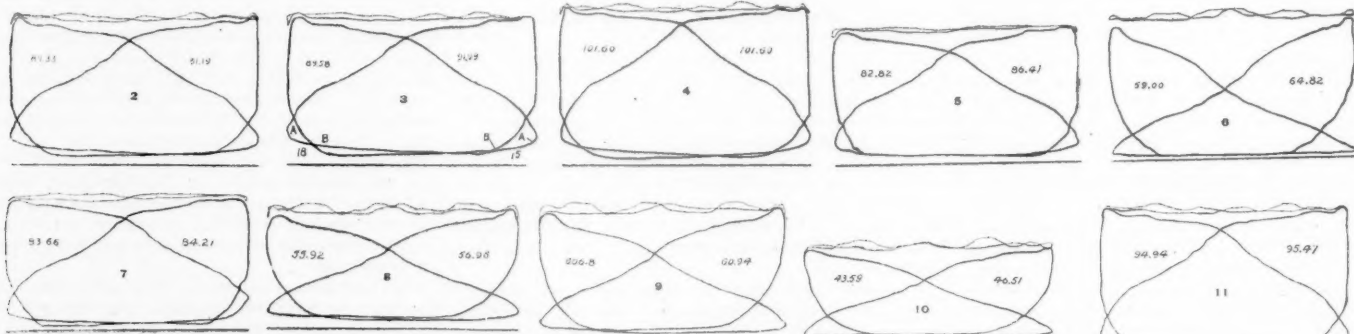
Distance run..... 16.6 miles.
Coal consumed..... 3,142 lbs.
Water fed to boiler..... 16,350 lbs.
Area of grate..... 28.23 sq. ft.
Sq. ft. of heating surface in fire-box..... 188.54
Sq. ft. of heating surface, total..... 2,035.39
Weight of train back of engine and tender..... 148.1 tons.
Total weight of train, engine and tender included..... 252.6 tons.
Weight of engine and tender loaded..... 104.5 tons.
Water fed to boiler per pound of coal used..... 52 lbs.
Coal used per sq. ft. of grate..... 111.3 lbs.
Coal used per ton of total train load per trip..... 12.44 lbs.
Coal used per ton of total train load per mile..... 7.49 lbs.
Coal used per mile traveled..... 189.3 lbs.
Coal used per sq. foot of grate per hour..... 139.1 lbs.

As this was a preliminary trial the cards taken were not worked up.

Second Train.—On the afternoon of May 11 engine No. 1,304 started at 1:56 p. m. from the yard at Piedmont with six cars of coal weighing, all told, 344,200 lbs., or 172.1 tons.

Distance run..... 16.6 miles.
Coal consumed..... 3,375 lbs.
Water fed to boiler..... 16,464 lbs.
Area of grate..... 28.23 sq. ft.
Sq. ft. of heating surface in fire-box..... 188.54
Sq. ft. of heating surface, total..... 2,035.39
Weight of train back of engine and tender..... 172.1 tons.
Total weight of train, engine and tender included..... 276.6 tons.
Weight of engine and tender loaded..... 104.5 tons.
Water fed to boiler per lb. of coal used..... 118.6 lbs.
Coal used per sq. ft. of grate..... 119.6 lbs.
Coal used per ton of total train load per trip..... 12.2 lbs.
Coal used per ton of total train load per mile..... 7.35 lbs.
Coal used per mile traveled..... 203.3 lbs.
Coal used per sq. ft. of grate per hour..... 166.8 lbs.

Time.	Boiler pressure.	Pyro-meter.	Speed, miles.	Speed, feet.	Rev. per min.	Throt-tle.	Rev. lever.
May 11, 1891							
2.0 1/2	155	530	5	440	27.1	1/2	7
2.2 1/2	160	644	10	880	54.2	3/4	7
2.4 1/2	153	731	21	2,240	124.5	Full	7
2.6 1/2	150	716	20	1,700	108.3	Full	7
2.8 1/2	151	626	22 1/2	1,980	121.8	Full	7
2.10 1/2	153	644	24	2,068	129.9	Full	6 1/2
2.12 1/2	146	644	23	2,024	124.5	Full	6 1/2
2.14 1/2	147	644	25	2,156	135.4	Full	6 1/2
2.16 1/2	148	640	27	2,332	146.2	Full	8
2.18 1/2	150	644	25	2,156	135.4	Full	7 1/2
2.20 1/2	126	374	Start'g			Full	7 1/2



INDICATOR CARDS NOS. 2 TO 12—BALTIMORE & OHIO TESTS.

See table for particulars.

Time.	S. B. vac. m.	M. e. p. F. end.	H. p. F. end.	M. e. p. B. end.	H. p. B. end.	H. p. total.	Ind. traction.
May 11, '91.							
2.0 1/2	11	51.73	63.80	59.16	171.4	135.2	10,135
2.2 1/2		91.72	226.2	91.17	219.5	446.1	16,728
2.4 1/2		84.22	477.1	88.94	492.7	680.8	18,819
2.6 1/2	9	83.64	416.8	86.11	416.6	336.4	15,719
2.8 1/2	10	82.82	474.4	86.41	481.1	558.5	15,638
2.10 1/2	12	83.06	521.1	84.21	513.1	1,034.2	15,518
2.12 1/2	7	59.00	396.8	64.82	425.4	823.2	11,435
2.14 1/2		75.09	467.7	77.30	471.0	938.7	14,080
2.16 1/2		58.25		60.18			

Third Train.—On May 12 No. 1,304 started at 9:37 a. m. from Piedmont yards with seven cars weighing all told 403,900 lbs., or 203.45 tons. Cars contained coal.

Distance run..... 16.6 miles.
Coal used..... 3,750 lbs.
Water fed to boiler..... 19,893 lbs.
Area of grate..... 28.23
Heating surface in fire-box..... 188.54
Heating surface, total..... 2,223.39
Weight of train back of tender..... 203.45
Total weight of train, engine and tender loaded..... 307.95
Weight of engine and tender loaded..... 104.5 tons.
Water fed to boiler per lb. of coal used..... 53.1 lbs.
Coal used per sq. ft. of grate..... 132.9 lbs.
Coal used per ton of total train load per trip..... 12.18
Coal used per ton of total train load per mile..... 7.34
Coal used per mile traveled..... 226
Coal used per sq. ft. of grate per hour..... 172.98

Time.	Boiler pressure.	Pyro-meter.	Speed, miles.	Speed, feet.	Rev. per min.	Throt-tle.	Rev. lever.
May 12, '91							
9:37 A. M.	160	...	0-20	0	0	0-1/2	1-7
9:40	159	...	30	2,640	162.5	1/2	7
9:44 1/2	150	689	32	1,936	119.1	Full	6 1/2
9:46 1/2	149	716	21	1,848	113.7	Full	6 1/2
9:49	147	662	18 1/2	1,628	100.2	Full	6 1/2
9:50 1/2	145	644	18	1,584	97.5	Full	6 1/2
9:51 1/2	146	608	18	1,584	97.5	Full	6 1/2
9:53 1/2	146	644	19 1/2	1,716	105.6	Full	6 1/2
9:58 1/2	147	662	20	1,700	108.3	Full	6 1/2
10:03 1/2	147	662	19 1/2	1,716	105.6	Full	6 1/2
10:05 1/2	147	644	19 1/2	1,716	105.6	Full	6 1/2
10:08	146	644	20 1/2	1,904	111.0	Full	6 1/2
10:10	146	644	19	1,672	102.9	Full	6 1/2
10:11 1/2	147	626	19	1,672	102.9	Full	6 1/2
10:14 1/2	147	632	24	2,112	129.9	Full	6 1/2
10:16 1/2	147	635	27	2,376	143.2	Full	7
10:19	148	642	24	2,112	129.9	Full	7
10:21	148	644	27	2,024	124.5	Full	7
10:23 1/2	150	626	27 1/2	2,420	148.9	Full	7

Time.	S. B. vac. m.	M. e. p. F. end.	H. p. F. end.	M. e. p. B. end.	H. p. B. end.	H. p. total.	Ind. traction.
May 12, '91							
9:40	13 1/2	89.58	602.4	91.90	605.0	1,327.4	16,590
9:44 1/2	10 1/2	91.72	497.1	93.32	494.6	991.7	15,913
9:46 1/2	10 1/2	89.56	498.4	91.16	481.2	981.7	16,500
9:49	10 1/2	90.65	413.3	91.72	409.0	822.3	16,667
9:50 1/2	10 1/2	91.2	404.6	92.06	402.6	807.2	16,816
9:51 1/2	8 1/2	92.00	408.2	91.46	396.8	805.0	16,770
9:53 1/2	9	90.93	416.9	91.18	428.5	865.4	16,642
9:58 1/2	10	89.30	440.1	90.66	436.9	877.0	16,413
10:03 1/2	10	89.56	430.4	89.83	422.2	832.6	16,396
10:05 1/2	10	89.36	434.2	91.16	428.4	862.6	16,590
10:08	9	88.51	457.1	91.45	442.4	895.6	16,416
10:10	9 1/2	89.33	435.1	89.56	428.6	865.6	17,184
10:11 1/2	10	81.69	429.7	93.02	426.0	857.7	16,887
10:14 1/2	10	89.33	528.0	91.19	531.5	1,059.8	16,560
10:16 1/2	10	70.93	471.9	72.26	470.1	942.0	13,083
10:19	10	73.06	431.0	74.66	431.6	863.5	13,492
1:21	10	78.67	455.7	81.06	449.1	904.8	14,752
10:23 1/2	10 1/2	71.49	484.4	72.29	479.0	963.4	13,137

Fourth Train.—On May 12 No. 1,304 started at 2:50 1/2 p. m. from the yards at Piedmont with seven cars weighing all told 462,000 lbs., or 231 tons; cars contained coal.

Distance run..... 16.6 miles.
Coal used..... 4,063 lbs.
Water fed to boiler..... 22,644 lbs.
Area of grate..... 28.23
Heating surface in fire-box..... 188.54
Heating surface, total..... 2,035.39
Weight of train back of tender..... 231.00
Total weight of train, engine and tender loaded..... 335.50
Weight of engine and tender loaded..... 104.5 tons.
Water fed to boiler per lb. of coal used..... 56.1 lbs.
Coal used per sq. ft. of grate..... 143.9
Coal used per ton of total train load per trip..... 12.11
Coal used per ton of total train load per mile..... 7.39
Coal used per mile traveled..... 244.8
Coal used per sq. ft. of grate per hour..... 158.5

Fifth Train.—On May 13 the engine hauled train No. 5 from Keyser to Grafton going west, made up of the following cars:

Postal No. 17..... 67,200 lbs.
Baggage No. 102..... 53,600 "
Coach No. 502..... 60,900 "
Coach No. 514..... 55,200 "
Sleeper 'Numa'..... 92,000 "
Officers' car 'Delaware'..... 68,100 "
Weight of baggage..... 6,000 "
Weight of mail..... 8,000 "
Weight of passengers..... 8,000 "

Weight of train loaded..... 410,500 "

The schedule time for leaving Keyser is 4:30, arriving at Piedmont 4:40, arriving at Altamont 5:20, arriving at Grafton 7:25. The actual running time was as follows: Left Keyser at 4:30, arrived at Piedmont 4:40 1/2, arrived at Altamont 5:31 1/2, at Grafton 7:25.

It was practically impossible to keep account of the

Time.	Boiler pressure.	Pyro-meter.	Speed, miles.	Speed, feet.	Rev. per min.	Throt-tle.	Rev. lever.
May 13, '91							
4:40	780	23	23	2,464	151.6	3/4	6
4:43	820	28	24	2,464	151.6	3/4	6
4:44 1/2	900	27	27	2,376	146.2	1/2	7
4:46 1/2	900	16	16	1,408	86.6	1/2	7
4:48	100	17	17	1,408	92.1	1/2	7
4:49 1/2	900	17	17	1,408	92.1	1/2	7
4:52 1/2	900	15	15	1,320	81.2	1/2	7
4:53 1/2	900	17	17	1,408	92.1	1/2	7
4:57 1/2	900	17	17	1,408	92.1	1/2	7
5:03 1/2	900	17 1/2	17 1/2	1,540	94.8	1/2	7
5:05	920	17 1/2	17 1/2	1,540	94.8	1/2	7
5:10	950	19	19	1,672	102.9	1/2	6 1/2
5:11 1/2	900	20	20	1,760	108.3	1/2	6 1/2
5:15 1/2	900	19	19	1,672	102.9	1/2	6 1/2
5:17 1/2	940	18	18	1,584	97.5	1/2	6 1/2
5:20	980	27	27	2,376	146.2	1/2	7

Time.	S. B. vac. m.	M. e. p. F. end.	H. p. F. end.	M. e. p. B. end.	H. p. B. end.	H. p. total.	Ind. traction.
May 13, '91							
4:40	Start'g	43.59	300.7	46.51	314.8	614.5	8,230
4:43	Start'g	60.68	403.6	60.94	396.5	800.1	11,120
4:44 1/2	Start'g	85.38	333.4	80.67	345.5	681.0	15,960
4:46 1/2	Start'g	91.39	383.0	96.98	397.8	790.8	17,220
4:48	Start'g	92.36	387.1	96.65	396.1	783.2	17,275
4:49 1/2	Start'g	91.51	344.4	95.58	344.5	678.9	16,970
4:52 1/2	Start'g	92.89	389.3	96.92	397.2	786.6	17,350
4:53 1/2	Start'g	90.51	379.3	94.28	386.8	766.1	16,900
4:57 1/2	Start'g	90.51	394.4	94.82	406.0	790.4	16,940
5:03 1/2	Start'g	91.55	394.9	93.96	396.8	791.7	16,965
5:10	Start'g	92.44	432.8	95.68	438.1	870.9	17,190
5:11 1/2	Start'g	92.16	454.2	94.33	454.6	908.8	17,040
5:15 1/2	Start'g	88.99	416.2	91.59	419.4	835.6	16,490
5:17 1/2	Start'g	92.44	410.1	94.06	408.1	818.2	17,045
5:20	Start'g	Start'g					

fuel and water used on the Piedmont grade on this trip and on the return trip also, and hence, as the coal and water consumption for the round trip signify nothing, as a large portion of the time the engine was descending a grade, the data taken with regard to these points is omitted.

Sixth Train.—On May 14 engine 1,304 hauled train No. 2 going east from Grafton to Keyser. The train was made up of the following cars:

Postal No. 50..... 67,500 lbs.
Baggage No. 109..... 54,000 "
Coach No. 400..... 58,000 "
Coach No. 413..... 58,000 "
Sleeper 'Monroeville'..... 84,000 "
Sleeper 'Harlach'..... 84,000 "
Baggage..... 6,000 "
Mail..... 8,000 "
Passengers..... 9,000 "

Whole train loaded..... 429,700 lbs.

The schedule time from Grafton to Keyser is as follows: Leave Grafton 5:40, arrive Rowellsburg 6:33, arrive Terra Alta 7:10, arrive Piedmont 8:30 and Keyser 8:40.

Between Rowellsburg and Terra Alta there is a grade

Time.	Boiler pressure.	Pyro-meter.	Speed, miles.	Speed, feet.	Rev. per min.	Throt-tle.	Rev. lever.
May 14, '91							
5:43	140	660	10	1,672	102.9	1/2	7
5:50 1/2	160	960	20	1,760	108.3	1/2	7
5:55	157	960	20	1,760	108.3	1/2	7
6:07 1/2	153	960	22	1,936	119.1	1/2	7
7:02	156	960	21	1,848	113.7	1/2	7
7:04 1/2	157	1,000	20	1,760	108.3	1/2	7
7:07 1/2	157	1,000	20	1,760	108.3	1/2	7
7:11 1/2	153	960	20	1,760	108.3	1/2	8 1/2

Time.	S. B. vacuum.	M. e. p. F. end.	H. p. F. end.	M. e. p. end.	H. p. end.	H. p. total.	Ind. traction.
May 14, '91	Start-ing.						
5:42	11	92.27	432.0	95.20	435.9	867.9	17,130
6:50 1/4	9	92.26	454.7	91.91	457.6	912.3	17,105
6:55	9	89.90	487.2	90.97	482.2	969.4	16,524
6:57 1/4	9	91.94	497.2	95.47	483.1	971.5	17,100
7:02		93.64	461.5	91.98	457.8	919.3	17,337
7:04 1/4		93.32	474.6	96.86	466.8	941.4	17,650
7:07 1/4		93.20	483.9	98.46	471.5	958.4	17,970

known as the Cranberry grade, which averages 94.1 ft. per mile. The actual running time was as follows: Left Grafton 5:42, arrived Rowellsburg 6:33, arrived Terra Alta 7:13, arrived Piedmont 8:33, Keyser 8:39 1/4. The column marked "indicated traction" in the tables has been calculated from the horse power shown by the indicator cards and the speed of the engine. It shows the pull on the draw-bar which would be produced if the entire indicated horse power of the engine was used in pulling the train. The weight on the drivers is 103,300 lbs. or 51 1/2 tons. The average indicated traction was about 18,500 lbs. in one instance, or 330 lbs. per ton of weight on drivers. With this traction there was no indication of a gradual slipping of the drivers when pulling up the grade.

The fire varied from 1 ft. to 2 ft. in thickness, according

to eight and ten revolutions it was accounted for by the slipping of the drivers, which was noticeable at that time. These results do not show with certainty any creeping or imperceptible slip when going up hill with a full load, and lead to some interesting thoughts respecting statements which have been made by some writers on this subject. The slip of drivers in going up the Piedmont grade was as follows:

Location, Mile post.	Rev. going down, May 12, a. m.	Rev. going down, May 12, p. m.	Rev. going up, May 12, a. m.	Diff. in rev.	Rev. going up, May 12, a. m.	Diff. in rev.	Rev. going up, May 12, p. m.	Diff. in rev.
174-173	330	329	3 6	3	330	328	330	328
173-172	326	328	327	1	327	328	327	328
172-171	326	321	323	5	327	327	327	327
171-170	326	326	329	3	327	327	327	327
170-169	330	309	319	10	319	319	319	319
169-168	330	330	334	4	334	334	334	334
168-167	326	325	326	1	326	326	326	326
167-166	326	325	326	1	326	326	326	326
166-165	326	325	324	2	326	326	326	326
165-164	324	325	326	2	327	327	327	327
164-163	326	3 6	328	2	327	327	327	327
163-162	325	325	326	1	327	327	327	327
162-161	326	325	324	2	326	326	326	326
161-160	326	326	321	5	326	326	326	326
160-159	325	325	329	4	329	329	329	329
159-158	326	326	323	3	323	323	323	323

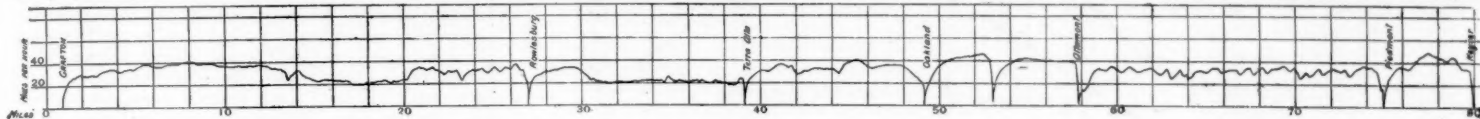
of about 13 lbs. between the boiler and the steam chest when an immense volume of steam was being used per minute. The average back pressure during the first exit of the exhaust, that is, from A to B on the card, is 20 lbs. The average back pressure during the remainder of exhaust is 13 1/2 lbs. The average back pressure during compression is 26 1/2 lbs. The average back pressure during the whole stroke is 16 lbs. The exhaust at this time produced a vacuum in the smoke box of 13 1/2 ins. of water, while the temperature in the smoke box was 1,000° F.

Notes and Conclusions Deduced from These Tests.

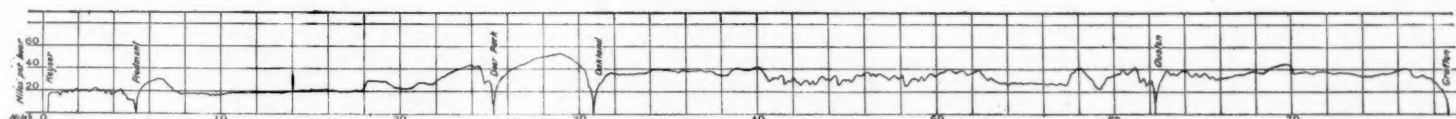
First. The indicated horse power of this engine is at times as great as 1,300, at a speed of 30 miles per hour, and it is probably, therefore, the most powerful express locomotive that has ever been constructed, or at least that is now in use.

Second. When generating such enormous horse power at comparatively slow speed, there is a vacuum varying from 12 to 16 in. of water, but this is to be expected when such large volumes of steam have to be exhausted from the cylinder at each stroke. The cutoff is about 1/2, and with a thick fire the amount of exhaust steam at the cutoff would necessarily produce a high vacuum.

Third. The traction at the rail calculated from the indicator cards, including the internal friction of the locomotive itself, averages about 17,000 lbs. when the engine



Grafton to Keyser, May 14, 1891.

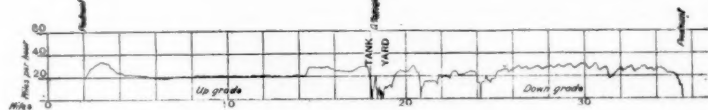


Keyser to Grafton, May 13, 1891.

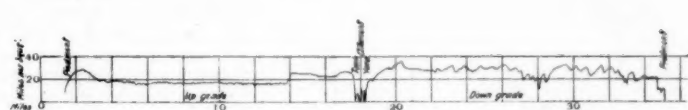


Down Piedmont Grade, May 11, 1891.

Down Piedmont Grade, May 9, 1891.



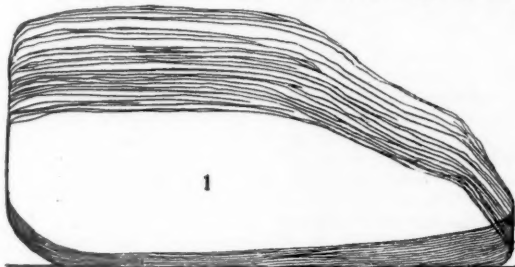
Up and Down Piedmont Grade, May 12, 1891, A. M.



Up and Down Piedmont Grade, May 12, 1891, P. M.

BOYER SPEED RECORDER DIAGRAMS—BALTIMORE & OHIO TESTS.

to the portion of the road on which the engine was being operated. It was found impossible to keep the grates covered under the heavy blast unless there was about 2 ft. of fire under the back end of the box while starting and while running up the heavy portions of the grade. It was this thick fire that rendered possible the vacuum of 16 in. of water which was occasionally registered.



Indicator Card Taken at Starting and Showing Gradual Increase of Power—B. & O. Tests.

With a thin fire this would not have been possible, as the air would have passed through the grates and with sufficient rapidity to have reduced the vacuum.

One of the most interesting results of these tests is the following, which shows the difference in revolutions of drivers when the engine was pulling up hill fully loaded and when going down hill. The table gives the numbers of the mile posts and the revolutions of the drivers between them when going up and down hill. The revolutions down hill are found in the first two columns, and the coincidence of the number of revolutions proves two things, viz.: that the mile posts are not all properly placed, and that the observations were made as nearly as they could be made with a recorder which did not account for fractions of a revolution. When the mile post was directly opposite the end of the locomotive the observer read the revolution counter, which, being graduated only for complete revolution, rendered possible a discrepancy of nearly two revolutions between any two posts. Therefore, in the columns of differences in revolution between the up and down hill trips, allowance must be made for a possible average error of one revolution. In the cases where the differences amount

Indicator cards, numbers 1 to 12, the particulars regarding which are given in the table, were taken during the tests of this ten wheel engine, and show some peculiarities of action, as follows:

Card No. 1 was taken at starting, and shows the variation of steam pressure in the cylinders from the first movement of the engine to a point where the cutoff is changed by the engineer. Probably this card represents the variation in starting power from the beginning to the attainment of 10 miles per hour in the ordinary locomotive when handled by the average engineer. It is interesting to note the gradual change in the back pressure from zero to an average of 10 lbs. per sq. in.

Card No. 2 was taken at a speed of 21 miles per hour with a boiler pressure of 150 lbs. per sq. in. The mean effective pressures are marked on the card. The total horse power was 1059.8. The average steam chest pressure was 142 lbs. This card shows how well the valves in this engine were set. The mean effective pressures on the two ends of the cylinder vary less than 2 lbs. per sq. in.

Card No. 3 was taken at a speed of 30 miles per hour, with a boiler pressure of 155 lbs. per sq. in. The horse

is pulling a maximum load which she will take up the grade on time, the running time being 46 minutes for 16.8 miles.

Fourth. The maximum rate of fuel consumption per square foot is 173 lbs. per hour. With this there was an evaporation of 5.3 lbs. of water, per pound of coal used, into dry steam at 160 lbs. boiler pressure. The steam furnished to the cylinders by the boiler was shown by the calorimeter to contain but one-half of 1 per cent. of water. This is for all practical purposes absolutely dry there being less moisture than is ordinarily found in steam furnished to stationary engines from stationary boilers. Calculations show that this should be the case, as the area of the evaporating surface from the water in the boiler and the volume of the steam space is considerably larger than is ordinarily allotted to stationary boilers for the same horse power and proves the excellence of the boiler design.

Fifth. The conditions under which this engine is operated are peculiarly adapted to show a saving with compound locomotives. The simple engine cuts off at 1/2 of the stroke; hence, there is less than one expansion. Manifestly the compound with 6 to 8 expansions would be more economical than the simple engine working with 1/2 cutoff. An estimate shows that this saving would probably be about 40 per cent.

Sixth. The water-meters used in this test are more reliable than any system of measurement with tank glasses. They are more convenient and they worked without a single failure.

Seventh. The speed recorder (see diagrams) used was sufficiently accurate to determine the speed at any time within 1/4 mile per hour. In such tests as these a time attachment should be used, with a recorder to mark on the paper each 15 sec. interval of time in order to locate the point on the grade where the indicator cards are taken.

Eighth. The pyrometer showed the temperature of the smoke box to reach at times as high as 1,200 deg. F. This might be expected from the heavy blast and the large amount of fuel used (173 lbs.) per square foot of grate per hour.

Ninth. The fall of pressure between the boiler and the steam chest with a cutoff of about 1/2 of the stroke and at a speed of 30 miles per hour was about 13 lbs., which shows the value of the large throttle and steam pipes used in this engine.

Number of card.	Date.	Time.	Boiler pressure.	Pyrometer reading.	S. B. vacuum.	Speed.	Total H. P.
1	May 12, '91	2:50 1/4	155	620	10	21	1059.8
2	"	10:14 1/2	147	330	10	31	1327.4
3	"	9:40	150	1,100	15	18	891.5
4	"	2:58 1/4	146	310	11	23	958.5
5	May 11, '91	2:28	148	310	7	27	823.
6	"	2:30	147	340	10	25	1034.1
7	"	2:55	157	740	8	23	632.4
8	May 12, '91	4:44 1/4	160	900	10	27	800.1
9	May 13, '91	4:12	160	820	10	28	614.5
10	"	7:02	157	960	9	21	974.5
11	May 14, '91	4:49 1/4	158	900	7 1/2	17	785.2

power reached the very high figure of 1327.4. As this card shows nearly, if not quite, the largest horse power yet indicated on a locomotive engine, at 30 miles per hour, it is interesting to note some of the particulars of steam entrance and exit to and from the cylinders. The average steam chest pressure is about 142 lbs., showing a loss

Tenth. The revolution counter did not indicate that the drivers had an imperceptible slip in mounting the heavy grade with its maximum train, and the number of revolutions from the bottom to the top of the hill less those which took place when the drivers were suddenly skidded corresponded closely to the distance over which the engine traveled.

Eleventh. The amount of water lost at the injectors in a test of this sort where the feed water is constantly being supplied to the boiler is too small to affect the results.

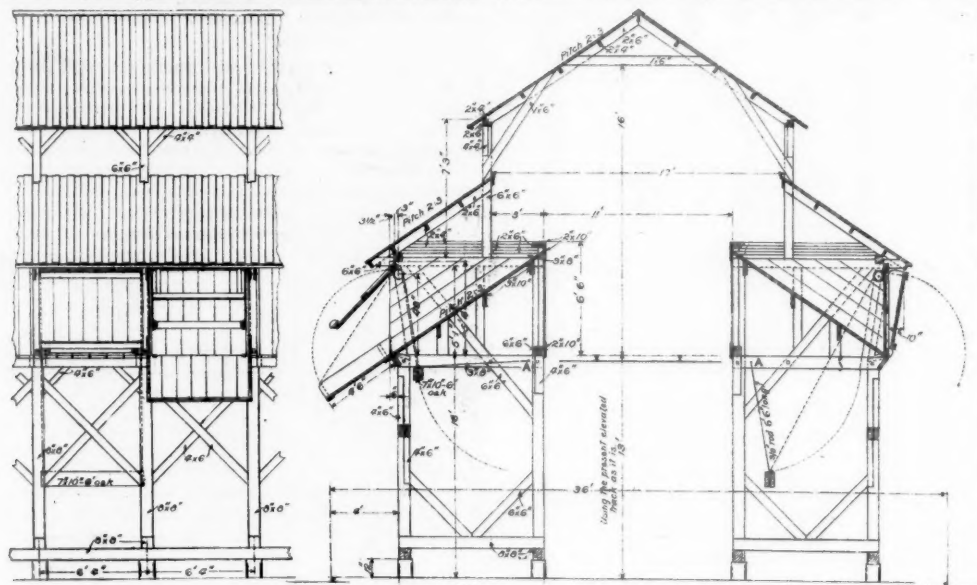
Twelfth. When near the top of the grade and when the water storage power of the boiler had been nearly exhausted, the application of the second injector reduced

amount of moisture in the steam which takes place at starting, it is necessary to expose the bulb of the thermometers directly to the wiredrawn steam. If supported in oil or metallic cups, the inertia of the thermometer will lead to erroneous results.

Eighteenth. A calorimeter to show the action of a locomotive boiler should be placed in the steam dome, rather than in the steam pipe.

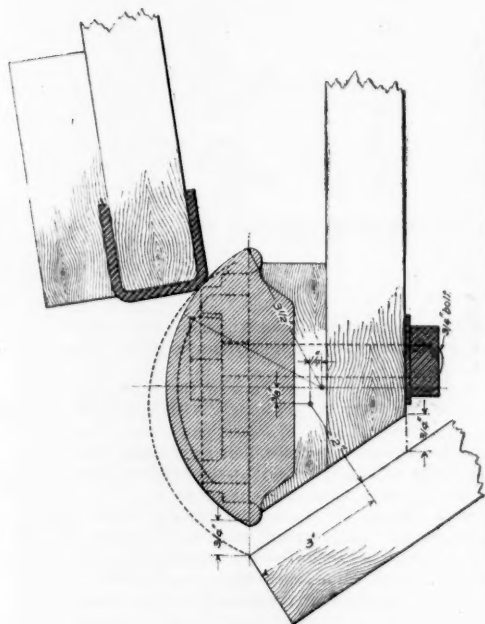
Chutes for Coaling Locomotives.

The economic handling of coal at supply stations is forced into prominence by the great quantity required for the motive power of the larger trunk lines. It has



Front View.

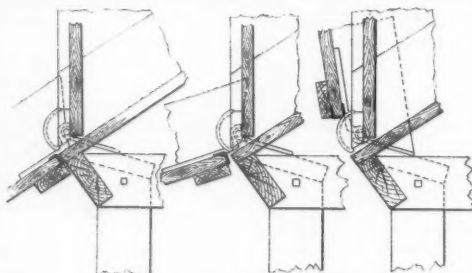
Cross-Section.



Detail of Lock.

become necessary to coal engines not only cheaply but with the least possible delay, and what has been sought after has been some form of chute which may be worked easily by one man, and in the construction of which but few parts shall be used, and of such design as to allow of being repaired at small cost.

In the old chutes, patents for which were taken out some twenty-five years ago, were used pulleys, chains and balance weights, but in such a way as to close the apron with considerable momentum, sufficient to rack the entire mechanism and disarrange the working parts. The next change, in order to overcome this detrimental feature, was the pivoting of the apron so as to be self-balancing, and thereby discarding the chains and weights. This, however, gave several times as much weight and strain on these pivots as when the front end



Detail—Three Positions of Apron.

SUSEMIHL COAL CHUTE—DESIGNED FOR JACKSON JUNCTION, MICHIGAN CENTRAL RAILROAD.

the steam pressure from 150 to 130 lbs. within less than $\frac{1}{2}$ minute.

Thirteenth. A good water glass is absolutely essential in measuring the water line in a boiler. No reliance can be placed on the sound of the gauge cocks. With tests of short duration, the measurement of the water line of the boiler is the one of all water measurements most liable to be in error.

Fourteenth. With a short interval between tests it is impossible to make the fire; hence, there is need of a careful measurement of the fire line in the furnace before and after the test.

Fifteenth. Coal can be conveniently carried in bags containing from 100 to 150 lbs., and can be opened readily by the fireman without interference with his work, even when firing on a heavy grade.

Sixteenth. The vacuum gauges should automatically record the variations in the vacuum, as it is nearly impossible to make an accurate record coincident with the taking of the indicator cards.

Seventeenth. The steam passing into the throttle in the case of this engine was practically dry at all times, and as a wire-drawing calorimeter when used for a steam pressure of 160 lbs. will show accurately up to 4 per cent of moisture, it is probable that such a calorimeter has a sufficiently wide range for general locomotive work. In order to show the rapid changes in the

was held up with chains, and the sides of the apron are apt to be pushed out unless well supported. This also necessitates the locking at the top of the apron in some manner, as otherwise (it being balanced) it is liable to be blown open by heavy winds.

The form of pocket which we illustrate here is one designed by F. G. Susemihl, of the Michigan Central road. While not abandoning the chains and weights, they are so adjusted that "the outward pull of the top of the apron due to its vertical thrust beyond the pivot is taken exactly for each position of the apron. This amount varies from nothing, up to nearly the weight of the apron. The balance block, in this case a 7 in. x 10 in. x 6 ft. oak timber, and is suspended below the pocket from a point at the rear (A), about which it swings with the two $\frac{3}{4}$ -inch rods as radii, at either end. When the apron is down, the entire weight of this block is held by the other end of the apron chain, but as the apron rises, less and less of this weight is so sustained until the apron is closed, when nearly the whole of the weight of the block is carried from the point A. As will be readily understood all necessity for latches is done away with, as the closed apron forms an absolute and reliable lock for the inner door. Two segmental castings are attached to the lower end of the inner door and small angle iron shoes fitted over the lower end of the apron at each side. These shoes rub against the castings and thus keep the inner door closed

until the apron is nearly down. The swinging radius of the corner of the shoe and the radius of the casting are the same, but the centre of the former is a trifle lower and forward of the latter, thus constantly relieving the pressure against the inner door as the apron is lowered. The casting is so made that it may be adjusted up or down somewhat by loosening the $\frac{3}{4}$ -in. bolt at the back. The friction here obtained between the angle irons and castings is sufficient to prevent any gaining of momentum by the apron, and yet by the manner in which the weight is taken by the block from below it may be easily moved with but slight effort and will remain at any inclination. The small sketches show clearly the relation of the apron and inner door to each other at the intermediate and two extreme points of movement.

The simplicity of construction, the absence of all latches and small parts, and the fact that there is so little to get out of order, would be sufficient to attract the attention of engineering and motive power departments. The swinging of the apron from a point several inches inside its lower edge by means of hooked straps allows any coal dust or small pieces to drop through to the ground instead of clogging up the hinges. All the iron used in these chutes costs between five and five and a half dollars, the entire cost of building being considerably less per pocket than with many of the forms now used by different railroads. The older patterns used at coaling stations are not only difficult to operate, but frequently cause more or less serious accidents from their being only partially locked, a fault not uncommon with the latching devices. Many of these chutes are in operation on several of the Western lines, and continued use has demonstrated their efficiency and low expense for repairs.

The City & South London Subway.

BY A MEMBER OF THE AM. SOC. C. E.

This company started out nearly a year ago with a uniform fare of 4 cts. for any distance. At the meeting of shareholders in August last the Chairman stated that the most important question to consider was how to better fill the trains during the slack hours of the day. He said: "We have made an effort to do that in certain cases in the half year—in the last two or three months—by reducing the fares from 2d. (4 cts.) to 1d. (2 cts.) from certain stations at certain stated times during the day. It has resulted in our carrying from those stations already three times the traffic we carried before, and therefore our receipts are increased at those stations some 50 per cent." This is what I advocated in the *Railroad Gazette* long ago. The Chairman went on to say that so long as the trains at other hours were full at the 4-cent fare they would not reduce that fare. It is now announced that between the hours of 8 and 10 a. m. the fare is to be 6 cts., and we believe this extends to the busy time in the evening also, but we cannot learn that any arrangements have been made whereby this heavy fare will only take effect on the busy track. As all passengers have to enter by the same pay gate it would then be necessary for the busy route passengers to pay again down below, or the heavy fare will choke off all traffic on the other track, on which there are then so few passengers.

Such changes are perhaps necessary in an experimental enterprise, but any one knowing London could have foreseen the mistake of the four cent fare. The new fare of 3d. for busy hours also seems to be a mistake, as it is altogether too high. There is talk too of season tickets being issued, and in this we foresee trouble, for holders of season tickets will expect to find room and will probably be disappointed. Of course this increased fare is laid with the idea that the busy period trains will still be filled and the extra fare will be all profit.

So far there has been revenue sufficient to pay debenture holders and leave a very small margin for ordinary shareholders, but it is very small, only £30, and practically the total traffic is insufficient to pay interest on capital, whatever it may do on true cost; and yet if the rate of traffic during busy hours could be maintained all day there would have been a return of threefold what was actually received at practically no increase of cost. But until this can be accomplished to an extent sufficient to give a return to ordinary shareholders it is certain that capital will not be forthcoming to build another so expensive a line.

There is of course the future prospect of more passengers, if only from the gradual overcoming of the dislike of the ladies to the elevators. These prove somewhat of a deterrent so far to ladies, who should form a considerable portion of the passengers during the slack hours of the day, and every such line should always aim to connect a residential locality, not merely with the city or business quarter for the sake of the men morning and evening, but also with a shopping locality to secure the ladies during the day. For this reason a continuance of the line as proposed to Islington would probably pay well relatively. Upper street, Islington, is a noted shopping street and crowded almost to congestion with ladies shopping, who come from all over London, but the locality is not very accessible from South London. At present, too, the line is too short to obtain an elastic traffic; it is not four miles in length. This intensifies the folly of building it to the small diameter of 10 feet, which must ever shut it out from connection with future undertakings.

I pointed out nearly a year ago that the ventilation of

the line was not good, and foul as are the old underground tunnels, I very much doubt if the atmosphere therein would prove on analysis to be so charged with dioxide as is the subway. In my every experience a headache never follows a ride on the old line, though I often suffer from the sulphurous gases bronchially, and there is no sulphur perceptible on the subway, and so it passes with the ordinary Londoner as pure.

The half yearly report up to June 30, 1891, is interesting reading. It shows that the length of line open is 3 miles 12 chains, the train mileage run 141,408, and the number of passengers 2,412,343. The receipts were £19,888, and the expenditure £15,520, or no less than 78½ per cent. of the receipts. The amount of expenditure set down to locomotive power (including of course the generating station expenses) is £6,587, or 42½ per cent. of the total expenses.

The total capital cost is £821,353 (say \$4,106,700), of which debentures amount to £167,300 (say \$836,500), so that the actual half year's revenue of £4,167 only just covers the £4,138 required to pay the 5 per cent. debenture interest.

In other words, there is not £30 left to pay the interest on the nearly £630,000 of ordinary stock. This truly precious 10-ft. drilled hole has therefore cost in dollars \$1,303,734 per mile, or over \$740 per yard, being at the rate of nearly \$20 per inch, including equipment. The most costly English railroad cost \$450,000 per mile, including steamboats and all equipment complete and heavy land charges from which the subway has been comparatively free.

The expenditure per train mile figures out at nearly 55 cts, and the receipts at nearly 69, leaving a profit of barely 14 cts. per train mile. Taking the half year as 180 days, the train miles per day are 785, which corresponds in round numbers with 250 journeys per day, or 125 each way. This is 7 per hour for 18 hours a day, showing a headway of 9 minutes. During the half year trains did not run every Sunday, so the above figures are approximate only. Of the 45,000 trains in the half year there must have been an average of 53½ passengers per train, or 17 per train mile.

The average receipts per passenger were 1.95 pence, and this includes all sources of receipts such as rent. The actual receipts were 1.98, so that the 1 penny fares had not acted very much on last half year's accounts. The cost of motive power was 11.18 pence per train mile, which is an amount less than some steam railroads, though in excess of others. The fees of the directors made up 4½ per cent. of the working cost and absorbed an eighth of the net revenue. They amounted to something like \$1,000 per mile of line, or nearly 3¼ per cent. of the gross revenue.

Compared with an ordinary steam railroad the ratio of expenses to receipts is enormous, at nearly 80 per cent. As the Chairman claimed that motive power was not to blame for this in respect to cost per train mile the excess must be sought elsewhere. The cost set down under the head of hydraulic includes, we must assume, in the absence of any explanation to the contrary, simply the elevators at the stations, 12 in all, and the item is \$7,301, but it is not stated if this also includes the attendance, but apparently it does not, and it may be supposed to include the proportion of motive power allotted to these expensive adjuncts.

There are 14 motors. The report states that two new motors are nearly ready, and a new train of cars has been received toward reducing the train headway. The average mileage of the motors, over 20,000 miles annually, is a satisfactory showing for electric motors, but the net receipts only exceeding by \$150 the amount required to pay the debenture interest, are not encouraging, especially when it is considered that the debentures amount to but a fifth of the total expenditure of capital.

The report gives no figures whatever from which can be gathered how the capital expenditure has been incurred, how much is really due to construction and tangible material and how much to abstract rights, etc. The Kilsby, double track tunnel on the London & Birmingham Railway, which was one of the most costly of English tunnels, and during the construction of which an immense water bearing sand bed was encountered, yielding for months 1,800 galls. per minute, which had to be pumped out, cost \$733 per yard, or less than the small double track tubes of the subway, in which no serious difficulties arose. After all allowances for the hydraulic elevators and for equipment it is not likely that the capital account of the subway is really constructional. If it were so, then there would be a poor prospect for any future line of similar type; nor do we see how the advocates of the type can continue their advocacy unless they can show that the capital account really has been overloaded with promoting money, and point a way to the avoidance of this in the future.

From actual knowledge, I may state that the result of 1d. fares from intermediate stations has caused workmen to use the line by walking over London Bridge and taking the trains from Boro' Road station toward Stockwell in the evening after the busy period of the city men is over. Without this 1d. fare these men would go by bus, and it would pay the line to institute the 1d. fare from the terminals after the busy hours, as workmen will not all walk over London Bridge to save 1d., and these take the bus at once and do not use the subway, which they would use at 1d. if they could get in at the terminus. Looking at the traffic on this line in com-

parison with an ordinary railroad there appears an enormous passenger traffic per train mile, though the receipts per train mile are not good. Each train will hold 120 passengers, but there are only 53½ passengers per train, so that the traffic could be more than doubled even if the whole 53½ passengers traveled from end to end, which is not the case.

No information is published showing the average passenger journey or even the number of passengers entering and leaving each station, though the entries at least are known by the turnstile indicators. If the receipts could be doubled without any addition to working expenses, so as to represent 107 train passengers, there would be available more than sufficient to pay the ordinary shareholders five per cent. in dividends, and this would leave a margin to increase working expenses by 20 per cent. approximately.

It is unfortunate that the trains fill at the termini during certain hours when they are most wanted also at intermediate stations. An addition to the number of trains at the busy period practically calls for a large addition of working expenses during that period, and would imply at least a corresponding increase in motive power even if the station staff could deal with the increased traffic. Still such increase would all mean something for the ordinary shares, but it is during the hours when trains run empty (the writer has been himself half a train load) that every additional passenger is practically all profit, and it is this period which the management will need to study in the matter of fares, especially as they have already trebled the traffic at the half fare.

CITY AND SOUTH LONDON SUBWAY—HALF YEAR ENDING JUNE 30, 1891. BASIS, £1 = \$5.

Miles open for traffic	3 m. 12 chs.	Cost of motive power per train mile	23 cents
Capital cost, including equipment	\$4,106,704	Maintenance of way per mile	\$53.6
No. of passengers	2,412,343	Carriage repairs per mile	\$37.1
Total receipts	\$98,187	Maintenance of way per train mile	\$0.0187
Of which		Cost of motive power per passenger	\$0.0136
Receipts from passengers	\$97,016	Traffic charges, including:	
Receipts from parcels	\$116	Hydraulic elevators	\$39,040
Fees and rents	\$1,169	Per train mile	\$0.226
Expenditure	\$77,604	Per passenger	\$0.0133
Cost per mile	\$1,103,734	Directors' fees per train mile	\$1,023
Train mileage	141,408	Directors' fees per passenger	\$0.0013
Receipts from passengers per train mile	\$0.686	Ratio of directors' fees to receipts	3¼%
Expenditure per train mile	\$0.548	No. of elevators per mile	3.8
Net return per train mile	\$0.138	No. of passengers per elevator	201,028
Passengers per train mile	17	No. of carriages	30
Receipts per passenger	\$0.0402	No. of motors	14
Proportion of expenses to revenue	78½%	Average mileage per half year per motor	10,101
Cost of motive power	\$32,936	Train mileage per mile of line	44,891
Ratio of cost of motive power to total expenditure	42¼%	Earnings per motor per half year	\$8,000
Train miles per day at 180 days per half year	785	Earnings per mile of line	\$31,000
No. of daily journeys	250		
Mean headway	9 minutes		
No. of train journeys in half year	45,000		
No. of passengers per journey	53½		

NOTE.—In this table the figures, having been translated on the basis of five dollars to the pound, are slightly larger than they actually are: the mean fare, which appears as 4.08 cents, being actually a trifle under 4 cents. The differences are not, however, of any moment.

LONDON, Nov., 1891.

The Bryant Rail Saw.

The illustrations which accompany this show very clearly a rail saw which has been on the market for

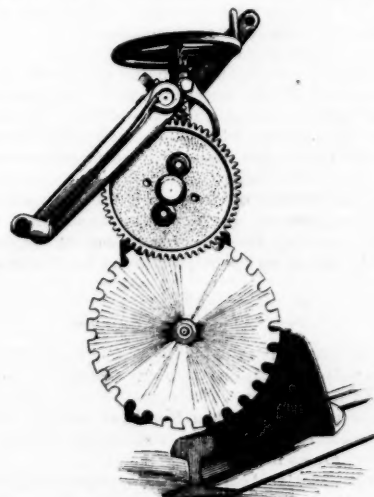


Fig. 1.

some months and is controlled by Messrs. Bryant and Barbey, of Boston.

Figs. 1 and 2 are different views of the portable saw and fig. 3 shows it adapted to be driven by power. It will be seen that the saw is driven from the circumference, the driving gear engaging back of the teeth. The

work is kept lubricated by an automatic oiler. The saw blade is made in thicknesses of one-eighth inch and one-quarter inch and diameters of 14 in. and 20½ in. We are told that a 70-lb. rail can be cut by the portable machine, which weighs 140 lbs., in from 8 to 12 minutes, and it can be cut at any angle up to 45 degrees.

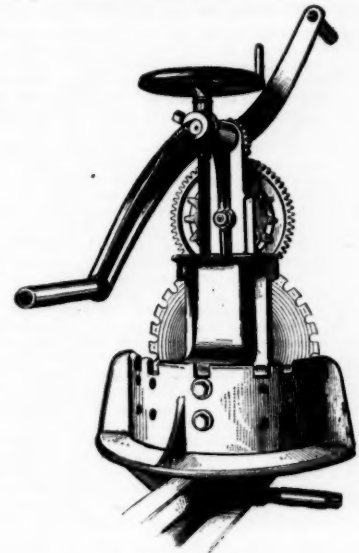


Fig. 2.

The machine has been quite extensively used on a good many railroads and the proprietors can show valuable recommendations from people who have had it in

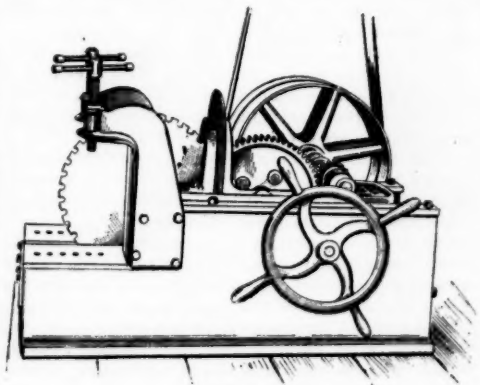


Fig. 3.

actual use. It is unnecessary to say anything for the great usefulness of a portable and practicable machine of this sort.

The Standard Code on the Lake Shore & Michigan Southern.

The train rules of the Lake Shore & Michigan Southern have been carefully revised, and a new book was put in use on Nov. 15 last. The prefatory "general notice" is signed by W. H. Canniff, Assistant General Superintendent. The standard code of the American Railway Association is closely followed as far as it applies, the only omissions from it that we have noticed being rules 511 and 512, referring to "19" train orders, which are not used on the road. Following is an abstract of the principal additions to rules 1-121 and 500-527. The general notice requests employees to "cultivate friendly relations with the public and with each other," and heads of departments are directed to promptly dismiss "any who show an uncivil or quarrelsome disposition."

Rule 18a directs conductors and engineers to ask the Superintendent for standard time by telegraph when necessary. Rule 19a provides for getting receipts by telegraph for new time tables. Rule 20a provides that all new trains created by a new time table shall be considered as on the road at and from the time their schedules take effect. Rule 32a provides for placing flags on both sides of a track in order to make sure that the engineman shall know which track the signal governs. Rule 84a directs that on double track all trains take the left hand track. Rule 85 is printed as in the standard code, but is supplemented by 85a, which requires the ruling train to wait three minutes at a meeting point. All trains, both passenger and freight, must be kept 10 minutes apart.

Rule 94a relates to the stops at grade crossings and drawbridges where interlocked signals are not provided. Rule 99 requires the rear brakeman (not the "flagman" as in the standard code) to go back 3,000 ft., and 99a requires him to go 2,000 ft. further "when on a curve or down grade, or in stormy or foggy weather"; and 99b requires flagmen when left behind to ride on the engine of the next train. Rule 104a is as follows:

In no case must a train be backed over a public crossing or highway, unless there is a man on the rear car or on the ground ahead of the car to see that the crossing is clear; nor must a car be cut loose and allowed to run over a public crossing or highway unless there is a man on the car, and in each case only after proper signal has been given. At night the man on such train or car must

have a light. Trains must not stand upon public highways to exceed five minutes. In cutting trains to open highway crossings, or in leaving cars at stations, neither engines nor cars must be allowed to stand upon any portion of highways.

Rule 114a requires all trains within the limits of a yard to be run under control. Rule 117 is followed by four supplementary rules, three of which are as follows:

(a) A train about to enter or leave a siding must come to a full stop before the switch is thrown, and no signal must be given to start the train until the switch is turned and the lock is secured through the hasp. When a train backs in on a siding to meet or be passed by another train, the engineer, when his engine is in to clear, will also see that the switch is properly set for the main track. No attempt should be made to close the switch until the last wheels are off the switch rails. The person who locks the switch must grasp the chain and pull the lock to see that it is securely fastened, and, having done so, must look at the switch rails and know that they are in their right position. (b) Running switches shall not be made. (c) It is positively forbidden to detach cars or engines from trains in motion except while switching at stations, or when switching and making up trains in yards.

Rule 521a forbids an operator to acknowledge the receipt of an order for a train that is at his station until the conductor has signed the order, which the conductor must not do until he knows that the engineer is held.

Rule 524 B is used, but is somewhat altered. An operator may clear a signal to allow the passage of a train which does not stop, even when he has orders on hand. When a train is stopped by a red train order signal it must not pass the signal thereafter, while it shows red, without receiving a clearance card, even though it has received a train order; but if the operator changes the signal to clear after the train has stopped, the train may proceed with either an order or a clearance card, but is not required to have both as in the preceding clause.

The supplementary rules, beginning at 600 and running to 893, take up more space than the standard code, the latter filling 52 pages and the other rules 63. These rules are very full and explicit and cover a good many points which we have not seen in other codes, particularly those numbered 600-634, which are general in their nature. Rules 117, a, b, c, quoted above, are samples of the careful work put upon this part of the code.

Most of these rules bear marks of the hand of Charles Paine, who compiled a code for this road when he was General Superintendent of it in 1875. The most obvious criticism on the 35 rules just referred to is that many or most of them are of the same nature as rules 1-11, and should therefore be inserted in that part of the code. The careful and thorough superintendent, however, must of course desire to embrace a large amount of material in these rules, and it is natural that he should hesitate to make such an important amendment to the standard code. To amplify rules 1-11 so as to make that chapter three times as large as it is might seem to impair the efficiency of some of the more important rules, and would certainly be of questionable value if the new rules were not better phrased than those of most individual codes. The standard code being the result of such a large amount of labor and care very few individuals are capable of making extensive amendments to it.

Some of the heads of these 35 supplementary general rules are as follows: Frequenting saloons, care in coupling, use of stick, general caution, making reports of injuries, walking upon tracks, care of switch keys, cleanliness, precautions against fire, uniforms, contracting bills, attendance at courts, acceptance of presents, selection of new men, legal processes, garnishee, examining board for promotion of conductors and engineers, notifying superintendents of proposed public improvements, etc. Next follow rules for different classes of employes, those for conductors and trainmen occupying 16 pages. There is an elaborate rule about announcing stations in passenger trains. Men making several hundred stops a day, as on the Manhattan Elevated, would have to abbreviate the Lake Shore formula considerably in order to live out their natural lives. The prohibition placed upon newsboys excludes "doubtful" papers as well as those of a worse character. Rules 636 and 744 are as follows:

No general relation of superiority exists between conductors and engineers, firemen, taggagemen or brakemen; nor between engineers and firemen or other trainmen; nor between yardmasters and engineers, firemen or other trainmen or yardmen; nor between train dispatchers, conductors, engineers, firemen, taggagemen and brakemen. The duty of each employe is herein set forth, and except as herein provided neither employe has any superiority of the other.

The engineer and fireman must see the signal at all towers, railroad crossings, junctions and drawbridges, and communicate with each other before proceeding.

Train dispatchers must go over their respective divisions at least once every three months. There is a good chapter on the use of car seals, although, like many other railroad rules, these require some practical impossibilities. The agent must see that the impression of the seal is clear and distinct, which, of course, he cannot always do personally; but a subsequent rule seems to authorize him to delegate this authority. Conductors must not break seals except at stations where there is no agent.

30-Inch Plate Piston—Lehigh Valley Compound Locomotive.

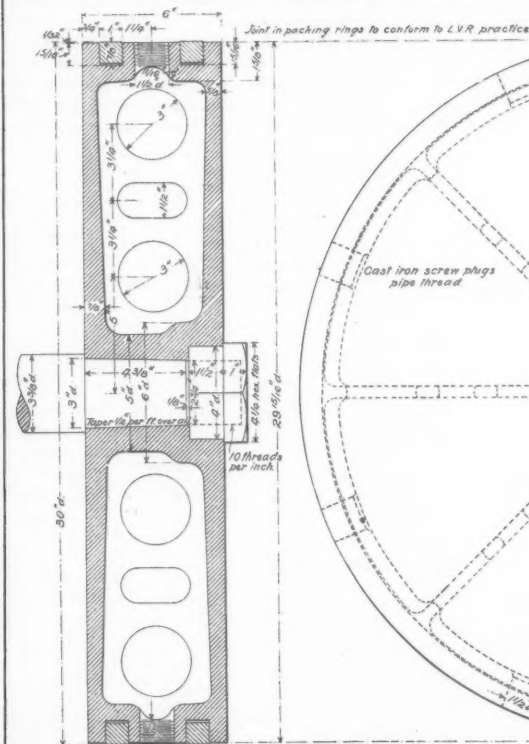
There is much difference in the various designs of pistons for the low pressure cylinders of compound locomotives. We have before referred to the Chicago, Burlington & Quincy compound as having a dished, plate piston made of cast steel, and the Vaucain compound with a wrought iron, double plate piston made in two

parts. The accompanying cut shows a piston designed by Mr. F. W. Dean for the 30-inch, low pressure cylinder of the Lehigh Valley compound.

This piston is made of cast iron of the dimensions given, and is exceedingly strong by reason of the webs which are cast between the two plates. Probably this piston is the strongest form of cast iron piston in use. It certainly weighs less than many cast pistons for much smaller cylinders now used. The head itself weighs 388 pounds without the rings; the rings weigh 38 pounds; the total weight is 426 pounds. Not long since a compound engine was built where the low pressure piston, which was smaller than this, weighed over 700 pounds. Even with this enormous weight the piston was not as strong as the one here illustrated. A 20-inch piston of this type weighs 214 pounds, and a 28-inch, 342 pounds. This is an illustration of a well designed piston made of cast iron, which is probably not too heavy for high speed work with large wheels.

Hollow Stay Bolts.

We have repeatedly had occasion to call attention to the mandrel rolled, hollow stay bolt iron made by the Falls Hollow Stay Bolt Co., of Cuyahoga Falls, Ohio.



30-in. Cast Iron Plate Piston for a Lehigh Valley Compound Locomotive.

This material is rolled hollow, in commercial lengths, and can be very readily cut to length for use. We are permitted to publish the following extract from a letter written by Mr. G. W. Stevens, Superintendent Motive Power Lake Shore & Michigan Southern, which gives valuable testimony as to the usefulness of this material: "It has been our practice for several years to use this hollow bolt for staying locomotive fireboxes, restricting its use to portions of the box where the risk of broken bolts is the greatest, such as the first row from top, around furnace door, and the upper corners of the throat sheet. The iron has given the best of satisfaction, and I have no hesitation in recommending our practice, believing that the advantages of the hollow bolt for the purpose of detecting breakages are much greater than in the solid bolt, drilled for a short distance, as it is the experience of those making use of the latter practice, that the drilled portion will become coated over with grease and other accumulations, and fail to give the desired notice when breakage takes place. This hollow bolt permits an opening both inside and outside of firebox, thereby presenting a double opportunity for detecting breakages, as the annular opening passes through the bolt entire and failure of the bolt at any point, will immediately make itself known."

Curves of Small Radius.

The French Ministry of Public Works recently ordered a commission to examine into the matter of working curves of short radius. This commission made a series of experiments, ending last March, at various points on the French railroads. The conclusions which they arrived at are as follows:

1. All locomotives, carriages and wagons employed in the ordinary working of the great French systems will run freely on curves of 100 metres radius, and even down to 75 metres, on the normal gauge of 1.45 metres, with no widening of the gauge.
2. Widening of the gauge offers no advantage, and it may be a cause of instability, and may augment the resistance.
3. The interposition of a tangent between curves in

opposite directions is useful only from the point of view of the action of the buffers, and consequently may be limited to 10 or to 20 metres in length.

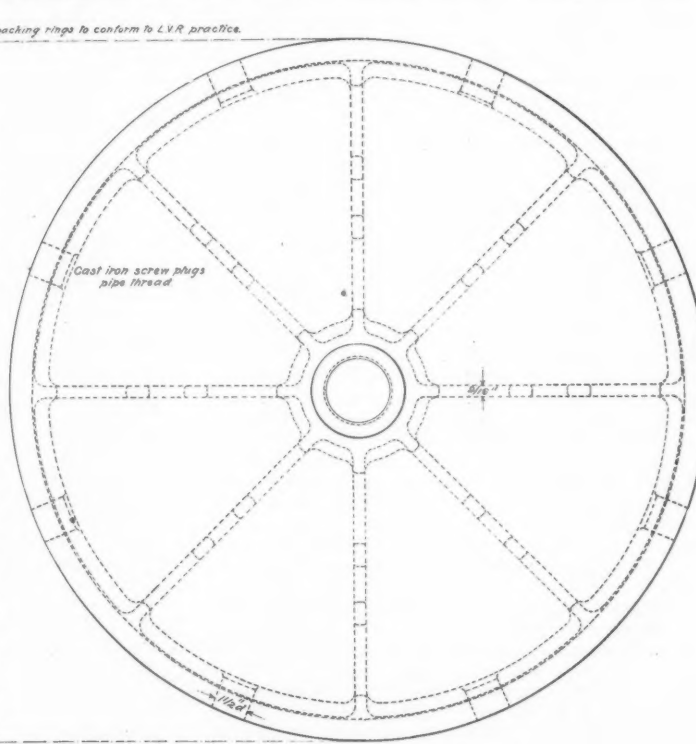
4. It has been found practicable to do away with all super-elevation without endangering the safety of trains, even at high speeds. Excessive super-elevation may become a cause of instability in aiding the movement of axles from the exterior toward the interior of the curve.

5. The resistance of all classes of carriages and of various types of locomotives on curves of 100 metres radius averages 8 kilograms per metric ton. This figure may be reduced to 5 or 6 kilograms without having recourse to arrangements which interfere with the simplicity of construction. On curves of 75 metres radius the mean figure of resistance did not exceed 10 kilograms per ton.

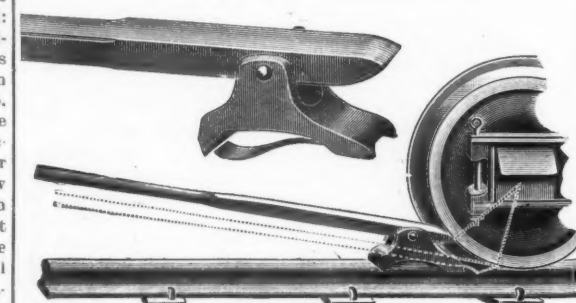
We gather this summary of the report of the commission from a recent issue of the *Journal des Transports*.

Car Pusher.

A car-starter and pusher, whose appropriate name is the "easy car pusher," is made by the Stafford-Munson Company, of Grand Rapids, Mich. The engraving shows



the gain in propelling leverage afforded by the device as compared with an ordinary pinch bar. The larger scale engraving shows the fulcrum, which has a sharp beel that holds firmly to the rail when the pressure is on



The Easy Car Pusher.

the bar, and which is released from the rail by the spring so as to be easily pushed forward when the hand pressure on the bar is relieved. The grip on the rail and the release are both instantaneous, so that the operator can work the bar rapidly up and down, following the car and keeping it in motion. It is an inexpensive tool and weighs only 15 pounds.

The Rhode Island Locomotive Works' System of Compounding Locomotives.

We give here the first description published of the system of compounding locomotives, which has been devised by the Rhode Island Locomotive Works and applied to two Brooklyn Elevated engines and to an eight-wheel fast express locomotive, which has been tested on several railroads in New England. All of the data furnished has been corroborated by the officers of the motive power department of the different roads.

This engine, No. 2,600, was designed for making high speeds on a comparatively level road with few stops, the object being to determine the comparative merits of the compound and single expansion engine at high

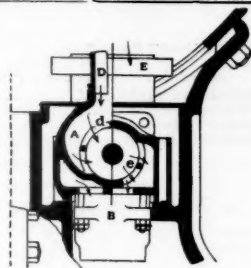


Fig. 1.

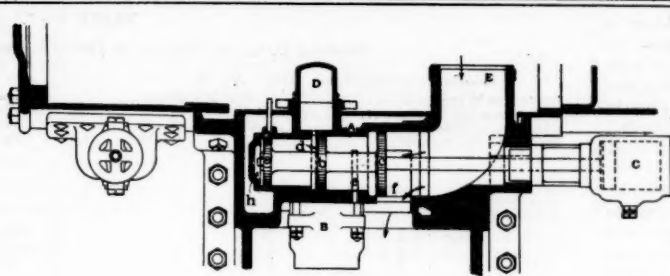


Fig. 2.

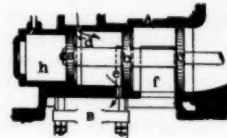
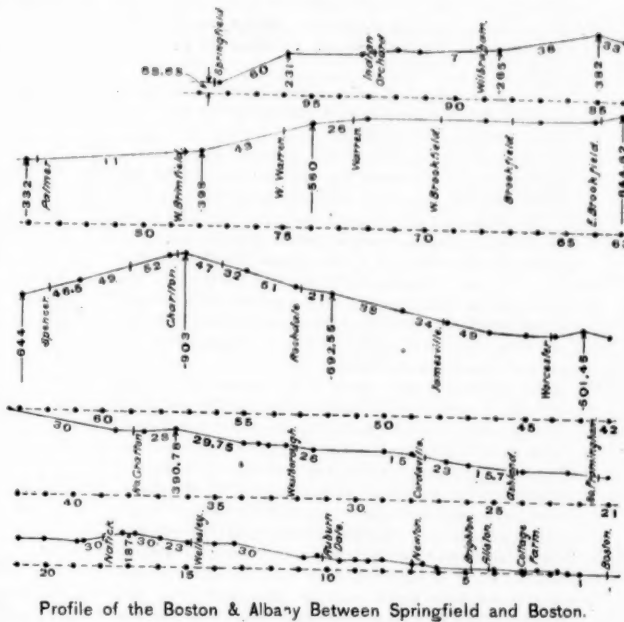
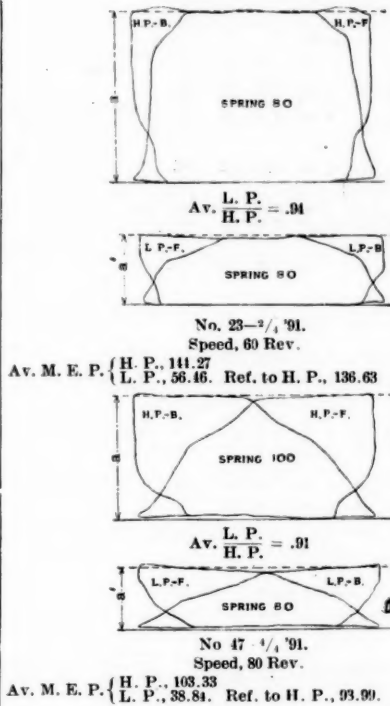
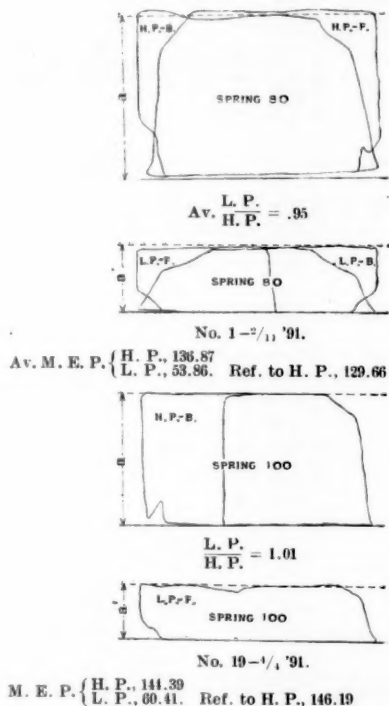


Fig. 3.

INTERCEPTING VALVE—RHODE ISLAND LOCOMOTIVE WORKS.



Profile of the Boston & Albany Between Springfield and Boston.

NOTE.—When H. P. piston has pressure *a* the L. P. piston should have pressure *a'* to make each total piston pressure equal. The L. P. cards show the positive action of reducing valve.

Engine No. 2,600—Diagrams in Simple System.

speed. The tests made were in connection with No. 34 on the New York, Providence & Boston Railroad, and No. 136 and No. 176 on the Boston & Albany, the two latter being similar engines. The compound has a larger grate and heating surface; that is, it has a slightly more advantageous heating surface owing to the increased firebox area. Undoubtedly the heavy grades on the Boston & Albany put the compound in a disadvantageous position, as it will be noticed that the cylinder power in proportion to the weight on drivers and the diameters of wheels is such as would be used for more level roads.

The intercepting valve used with this engine is shown by the accompanying cut. At starting the engine works as a single expansion engine having four exhausts per revolution, and then automatically changes to the compound. Figs. 1, 2 and 3 show the intercepting valve in various positions. Fig. 1 is a section through the valve at the ports *d* and *e*, fig. 2. Fig. 2 shows the valve when the engine is compounded, and fig. 3 when used with single expansion. In these illustrations *A* is the valve casing, *B* a reducing valve, *C* an oil dash pot, *D* a pipe from main steam pipe leading to intercepting valve; *E* leads to the receiver, *a*, *b* and *c* are the intercepting valve pistons; *d* is a port from the main steam pipe through the valve casing; *e* is a port from the intercepting valve to the reducing valve; *f* is a port from the intercepting valve to the low pressure steam chest.

The operation of this valve is as follows: Whenever the throttle is opened steam passes to the high pressure cylinder in the usual manner, also through pipe *D* to the intercepting valve, and forces the piston to move to the position shown in fig. 3. This closes the passage to the low pressure cylinder and steam from the pipe *D* passes through the small ports *d* and *e* into the low pressure steam chest through the reducing valve. The piston of the intercepting valve is so proportioned that it will automatically change to the position shown in fig. 2 whenever the desired pressure in the receiver *E* has been reached by the repeated exhausts from the high pressure cylinder. Thus the engine starts with steam in both cylinders and automatically changes to compound at any desired receiver pressure.

The engine is changed from compound to simple at the will of the engineer by opening a valve connecting the receiver to the exhaust pipe, which allows the exhaust for the high pressure cylinder to pass through the exhaust nozzles in the usual manner. The operation by the engineer of this separate exhaust valve allows the steam

in the receiver to enter the cavity *h* in the intercepting valve, which forces the piston of that valve to the position of fig. 3, before the receiver is emptied through the exhaust. This secures continuous action in the low pressure cylinder during the change from compound to the simple system while running. It is obvious that the engine may also be operated as a simple engine continuously at starting when desired.

The profile of the Boston & Albany road between Springfield and Boston will serve to show the nature of the express work done on that road. The following is a table of dimensions of the four engines:

Engine.	Compound.	Simple.	
		N. Y., P. & B.	B. & A.
No. 2,600	No. 31	Nos. 173 & 136	
Fuel.	Soft coal.	Soft coal.	Soft coal.
Cylinders, sizes, R. S.	28 in. x 24 in.	18 in. x 24 in.	18 in. x 22 in.
" " " " L. S.	18 in. x 24 in.	18 in. x 24 in.	18 in. x 22 in.
Drivers, diameter.	78 in.	72 in.	70 in.
Boiler.	52 in.	52 in.	52 in.
" flues, O. D.	2 in.	2 in.	2 in.
" " " " number.	214	205	221
" " " " length.	10 ft. 10 in.	11 ft. 10 in.	11 ft. 0 in.
Grate, style.	Cast iron rocking.	Cast iron rocking.	Cast iron rocking.
" " " " size.	78 1/2 in. x 34 1/2 in.	72 1/2 in. x 34 1/2 in.	71 1/2 in. x 35 1/2 in.
" " " " area.	18.65 sq. ft.	17.72 sq. ft.	17.41 sq. ft.
Heating surface, total.	1213.81	1236.63	1236.62
" " " " firebox.	157.57	120.45	118.78
" " " " flues.	1086.26	1116.18	1117.84
Area, ratio heating surface to grate.	65.69	69.78	71.02
Weights, loaded.	103,230 lbs.	91,250 lbs.	91,000 lbs.
" " " " drivers.	66,520	60,200	61,500
" " " " truck.	36,710	31,050	29,500

*Including 19.63 sq. ft. firebrick tubes.

No. 2,600 has been in successful general service on all the heavy and fast trains on the New York, Providence & Boston Railroad between Providence and New London, a distance of 64 miles. The terminals are at tidewater, and the intervening road has a rolling surface, there being grades each way from 1/2 to 1 per cent. The line of road is practically straight. Tables Nos. 5 and 6 give the results of competitive trials on two of these trains; that represented by Table No. 5 was made to show coal economy only.

The service on the Boston & Albany Railroad was between Boston and Springfield, a distance of 90 miles,

and was of a different nature from that on the New York, Providence & Boston Railroad. This will be seen on reference to the profile sketch following, the steepest grades on this road having bad curves. In making the schedule time between the terminals advantage cannot be taken of the down grades to the extent of over 42 miles per hour, and the making up of lost time is limited to five minutes each between Worcester and Springfield and Worcester and Boston; thus the time which an engine designed for a more level road might lose on a bad up grade could not be made up on the down grades, and but five minutes could be made up on the levels. In order to make the running time, therefore, little time can be lost on the hills. The compound, as before mentioned, is not designed for this class of service, but, as will be seen on reference to Tables Nos. 7 and 8 following, it had no difficulty in making its time with the other engines.

Conditions of Test.—The competing engines on each trial were run on the same trains, the same number of days, with the conditions as nearly alike as possible, the same engineer handling each engine, enough days being taken to insure a fair average. The engineers had no experience with the compound previous to the first day of each test, but were regular runners on the competing simple engine, with the following exception: On the trial of March 16 to 21, inclusive, the engineer had No. 34 but a few days before the test. The runs on the Boston & Albany Railroad were exceptionally hard for each engine, as the road was undergoing repairs in numerous places between Boston & Springfield, which necessitated many slackenings and extra stops.

On the New York, Providence & Boston the conditions were very similar for each engine on each trial, with the exception of the runs on March 20 and 21, recorded in Table 5. On these dates the train, being an hour late from New London, was obliged to make extra station stops, beside stopping for several signals, and slowing for the suburban trains at stations near Providence. This affected the elapsed time between New London and Providence and also the general average of running time.

Coal and Water Consumption.—The coal economy, as given in Tables 5 to 8 inclusive, is based on car mileage. The results are practically the same as when based on ton mileage. Coal was weighed to the engine at the beginning of each trial, there being a low fire and no coal on the tank; that used by each engine includes the banking for over night. At the finish of the last run of a series the fire was allowed to burn low, and the remaining coal in the tank was weighed back. The coal account in all cases was kept by an employé of the railroad company. The quality of the coal on the New York, Providence & Boston was ordinary bituminous, about one-half lumps. The coal used on the Boston & Albany was best quality of Pocahontas, well mixed with lumps. Accurate water measurements were attempted on but

one test, objection being made to the delay incident to taking accurate readings when water is taken on the line of the road. From the observations which were made, however, there is every reason to believe that the trial in which the water was measured was the one in which least was saved. This would follow from the fact that it was the lightest of the four tests in point of work done and that in which the least coal was saved.

On the test in which water was measured, careful attention was paid to the measuring of all quantities not used in the cylinder, and high water in the boiler was guarded against. The water in the boiler water-glass was at the same place when final tank reading was taken at the end of the round trip, as when the first reading was made, the engine standing at the same spot.

Cylinder Performance.—Indicator diagrams Nos. 1-19-23-47 were taken from No. 2,600 with the simple system, the conditions being the same as those under which it is designed to be used when run as a simple engine. No. 47 was taken at an early cut-off to show the action at that point.

General Summary.—A reference to Tables 5 to 8 inclusive will show the saving in fuel consumption made by the compound on each given service, running in competition with selected engines on the respective roads, the engine in each case being the regular runner of the simple engine, but handling the compound for the first time. The engineers all claimed that they could do more justice to the compound on a longer acquaintance.

In point of cleanliness, *i. e.*, freedom from cinders and black smoke, the compound is a marked contrast to the simple engines. This feature was quickly observed and remarked by the engineer and trainmen on the first trips on each new train. From this fact the question naturally arises why the compound could not be substituted for the large and heavy anthracite coal burners which are run at large expense and considerable trouble on some fast trains, simply on account of the item of cleanliness. No. 2,600 needs no netting in the front end and has none.

If the compound locomotive can be run so that the smoke and cinder nuisance is satisfactorily dispensed with, which would seem to be the case, the cost of operating it as compared with an anthracite coal burner may be illustrated from an actual case as follows: Trains 23 and 42, N. Y., P. & B. R. R., (see Table 5) have an anthracite locomotive for a regular engine; it runs 29.5 miles per ton of coal as a regular average. Another anthracite locomotive on a somewhat lighter service on the same road, runs 30.5 miles per ton. Comparing the cost of anthracite fuel on trains 23 and 42 with the cost of bituminous fuel used by the compound on same trains (42 miles per ton), the saving in cost is 43 per cent., the bituminous coal costing 26 per cent. less delivered than the anthracite.

TABLE NO. 7.

GENERAL DATA AND RESULTS OF TESTS ON BOSTON & ALBANY RAILROAD.

Schedule running time. Train No. 19.

Boston to Worcester.....	44 miles, 68 min.
Worcester to Charlton.....	13 1/2 " 24 "
Charlton to Springfield.....	41 " 65 "
Boston to Springfield.....	98 1/2 " 2 h. 39 m.

Schedule running time. Train No. 18.

Springfield to Charlton.....	74 min.
Charlton to Worcester.....	23 " "
Worcester to Boston.....	70 " "
Springfield to Boston.....	2 h. 49 m.

TRAIN NO. 19—WEST.

Engine.	Date, 1891.	Boston to Worcester.	Worcester to Charlton.	Charlton to Springfield.	Actual running time, Boston to Springfield.	Average speed in miles per hour.	Car mileage.	Train weight, tons.	CAUSES OF DELAY.	
Compound, 2,600.	July 3	71	25	60	2 36	37.88	492.5	158.4	{ Freight at South Framingham.	
	4	69	23	64	2 36	37.88	394	131		
	5	69	24	63	2 36	37.88	394	131		
	6	71	24	61	2 36	37.88	438	141.8	{ Signal and slow-up near Worcester.	
	7	71	25	70	2 40	35.68	394	131	{ Signal and slow-up at So. Framingham.	
	8	69	25	62	2 36	37.88	394	131	{ Switch back to other main near Springfield.	
	9	72	23	62	2 36	37.88	394	131	{ Freight near Charlton.	
	10	71	25	60	2 36	37.88	394	131	{ Freight at Worcester.	
	11	72	26	62	2 40	37.03	492.5	158.4	{ Slow-up at Worcester.	
	B. & A., 136.	June 24	70	26	63	2 39	37.17	394	131	{ Signal at Worcester.
		25	70	22	64	2 36	37.88	394	131	{ Torpedoes at Charlton.
26		70	27	59	2 36	37.88	394	131	{ Wait for orders at Worcester and Charlton.	
27		72	25	61	2 38	37.45	492.5	158.4	{ Wait for orders at Worcester.	
28		72	22	63	2 37	37.59	394	131	{ Slow-ups at Worcester.	
29		70	24	62	2 36	37.88	394	131	{ Wait for orders at Worcester.	
30		69	22	63	2 34	38.47	324	131	{ Signals at Worcester.	
July 1		70	23	64	2 37	37.59	394	131	{ Slow-up at Worcester.	
2		69	23	64	2 36	37.88	394	131	{ Wait for orders at Worcester.	

TRAIN NO. 18—EAST.

Engine.	Date, 1891.	Springfield to Charlton.	Charlton to Worcester.	Worcester to Boston.	Actual running time, Springfield to Boston.	Average speed in miles per hour.	Car mileage.	Train weight, tons.	CAUSES OF DELAY.	Coal consumption, round-trip tons.	
Compound, 2,600.	July 3	69	23	69	2 41	36.71	591	182.9	{ Hot box on car near Boston.	3.5	
	4	71	23	69	2 43	36.26	591	182.9	{ Switch eng. at Bos'n	3.5	
	5	74	23	68	2 45	35.81	689.5	210.3		3.5	
	6	73	23	70	2 46	35.68	492.5	144.9		3.5	
	7	69	24	68	2 41	36.71	492.5	144.9	{ Worcester Jc. signal at tower 6.	3	
	8	70	23	65	2 36	37.45	492.5	144.9		3.5	
	9	72	23	69	2 44	36.08	492.5	144.9		3	
	10	73	23	70	2 46	35.68	492.5	144.9		2.5	
	11	72	23	67	2 42	36.48	492.5	144.9		3	
	B. & A., 136.	June 24	73	23	65	2 41	36.71	591	182.9		4
		25	72	23	69	2 44	36.08	492.5	144.9		5
26		69	23	65	2 37	37.59	591	182.9		4	
27		71	23	70	2 44	36.08	492.5	144.9		5.5	
28		74	23	70	2 47	35.43	492.5	144.9		4	
29		71	23	70	2 44	36.08	492.5	144.9		4.5	
30		73	23	70	2 46	35.68	492.5	144.9		3.5	
July 1		74	23	67	2 44	36.08	591	182.9		4	
2		72	23	69	2 44	36.08	492.5	144.9		5	

SUMMARY:

Number of regular stops. Train 19-1.

Number of regular stops. Train 18-2.

Engine number.	Total car mileage.	Total coal consumption.	Average amount of coal used per car mile.	Percentage of coal saved.	Average running time.		Average miles per hour.	
					Boston to Springfield.	Springfield to Boston.	Boston to Springfield.	Springfield to Boston.
2,600	8,613.5	29 tons.	6.73 lbs.	28.63%	2 hrs. 37 3/4 min.	2 hrs. 39 1/4 min.	37.51	36.32
136	8,372.5	39.5 tons.	9.43 lbs.	2 " 36 1/4 "	2 " 43 1/4 "	37.75	36.2

TABLE NO. 8.

GENERAL DATA AND RESULTS OF TESTS ON BOSTON & ALBANY RAILROAD.

Schedule running time. Train No. 83.										Schedule running time. Train No. 50.									
Boston to Worcester.....					41 miles, 70 min.					Springfield to Charlton.....					69 min.				
Worcester to Charlton.....					13.5 " 24 "					Charlton to Worcester.....					22 "				
Charlton to Springfield.....					41 " 64 "					Worcester to Boston.....					68 "				
Boston to Springfield.....					96.5 " 2 h. 41 min.					Springfield to Boston.....					2 h. 41 min.				

TRAIN NO. 83, WEST.										TRAIN NO. 50, EAST.									
Engine.	Date, 1891.	Running time in minutes.		Actual running time, Boston to Springfield.	Average speed in miles per hour.	Car mileage.	Train weight empty, tons.	CAUSES OF DELAY.		Springfield to Charlton.	Charlton to Worcester.	Worcester to Boston.	Actual running time, Springfield to Boston.	Average speed in miles per hour.	Car mileage.	Train weight empty, tons.	CAUSES OF DELAY.		Coal consumption, round trip tons.
Compound, 2600.	July 14	77	24	57	2:38	37.45	635	190.5	Switchback to other main at South Framingham.	73	21	65	2:39	37.17	612.25	181.9	Signal between Springfield and Charlton.		4
	15	70	23	65	2:38	37.45	591	180	Switchback to other main at Springfield.	70	22	67	2:39	37.17	612.25	181.9	2 signal stops near Charlton; slow-up at Wilbraham for single track.		3.5
	16	70	25	62	2:37	37.59	591	180		69	22	68	2:39	37.17	612.25	181.9	3 slow-ups between Springfield and Charlton; 3 signal stops between Worcester and South Framingham; signal between South Framingham and Boston.		3
	17	75	23	59	2:37	37.59	591	180	Slow-up between South Framingham and Worcester.	72	22	94	2:38	37.45	612.25	181.9	Slow-ups and signals between Springfield and Charlton; wait for orders at Worcester; delayed 30 minutes by break-down of train 48 near South Framingham.		3
	18	71	24	62	2:37	37.59	591	180		70	22	64	2:36	37.88	710.5	215.3	3 signal stops between Springfield and Charlton; flagged by freight at Boston.		3
	20	70	25	62	2:37	37.59	591	180		72	22	69	2:43	36.26	612.25	181.9	3 signal stops between Springfield and Charlton; 3 slow-ups and 2 signals between Springfield and Charlton.		3.5
	21	73	24	61	2:38	37.45	591	180		71	22	66	2:39	37.17	612.25	181.9			3.5
B. & A., 173.	6	71	26	61	2:38	37.45	689.5	207.4	{ Train of July 4 chosen as engine ran another train on July 7. }	70	22	70	2:42	36.48	800	242.7			5
	4	71	25	61	2:37	37.59	591	180		69	22	67	2:38	37.45	612.25	181.9			4.5
	8	70	24	64	2:38	37.45	591	180		70	22	67	2:39	37.17	612.25	181.9			4
	9	70	24	64	2:38	37.45	591	180		71	20	65	2:36	37.88	612.25	181.9			4
	10	73	24	61	2:38	37.45	591	180		69	22	65	2:36	37.88	612.25	181.9			4.5
	11	72	23	61	2:36	37.88	591	180		69	22	67	2:38	37.45	612.25	181.9			4.5
	13	72	23	61	2:36	37.88	591	180		69	22	67	2:38	37.45	612.25	181.9			4.5

Number of regular stops. Train 83-1.										Number of regular stops. Train 50-4.									
Engine number.	Total car mileage.	Total coal consumption.	Average amount of coal used per car mile.	Percentage of coal saved.	Average running time.		Average miles per hour.			Boston to Springfield.	Springfield to Boston.	Boston to Springfield.	Springfield to Boston.						
2,600	8,565	23.5 tons.	5.48 lbs.	21.6%	2 hrs. 37 1/4 min.	2 hrs. 39 min.	37.53	37.18		2 " 37 1/4 "	2 " 38 "	37.50	37.39						
173	8,718	30.5 "	6.99 "															

TABLE NO. 5.

GENERAL DATA AND RESULTS OF TESTS ON NEW YORK, PROVIDENCE & BOSTON R. R.

Schedule running time, train No. 23.
Providence to New London, 61 miles . . . 1 hr. 40 min.Schedule running time, train No. 42.
New London to Providence . . . 1 hr. 41 min.

TRAIN NO. 23—WEST.						TRAIN NO. 42—EAST.					
Engine.	Date—1891.	Running time Prov. to N. London.	Average speed in miles per hour.	Car mileage.	Remarks.	Running time N. London to Prov.	Average speed in miles per hour.	Car mileage.	Remarks.	Coal weighed out to engine—pounds.	
N. Y. P. & B.—34.	Mar. 16	H. M. 1:47	35.95	448	Hot box, train left 2 mins. late.	H. M. 1:40	38.55	448	Delayed by train No. 136, train left 15 min. late.	8,611	
	17	1:29	43.24	448	Train left 17 min. late.	1:41	38.09	512	Delayed by train No. 126; train left 10 min. late.	9,083	
	18	1:40	38.55	448	Train left on time.	1:36	40.0	448	Delayed by train No. 39; train left 6 min. late.	9,022	
				1,344				1,408			
									Weighed back	2,134	
									Total am't coal burned during tests . . .	21,538	
Compound—2600.	19	1:40	38.55	448	Train left on time.	1:35	40.5	448	Train left 6 min. late.	8,682	
	20	1:40	38.55	448	Train left on time.	1:42	37.64	448	(On these two days trains started 50 min late, consequently were obliged to run under control within 15 miles of Providence while meeting suburban trains. 1st day, stopped at Coweset for No. 41; 2d day 3 extra station stops and 2 signal stops near Providence.)	8,228	
	21	1:39	38.78	448	Train left 1 min. late.	1:55	33.5	512	Weighed back	4,418	
				1,344				1,408	Total am't coal burned during tests . . .	3,000	
										18,338	

No. of regular stops, train No. 23—3.

Regular slow-ups at time of tests: Elmwood on account of excavations; Mystic Bridge; New London Bridge.

No. of regular stops, train No. 42—3.

SUMMARY.

Engine number.	Total car mileage.	Total coal consumption.	Average amt. of coal used per car mile.	Percentage of coal saved.	Average running time.		Average miles per hour.	
					Prov. to New London.	N. London to Providence.	Prov. to New London.	N. London to Providence.
34	2,752	12.27 tons.	8.91 pounds.	25.2 per cent.	1 hr. 38.6 min.	1 hr. 39 min.	39.25	38.88
2,600	2,752	9.17 "	6.66 "		1 hr. 39.6 min.	1 hr. 44 min.	38.63	37.21

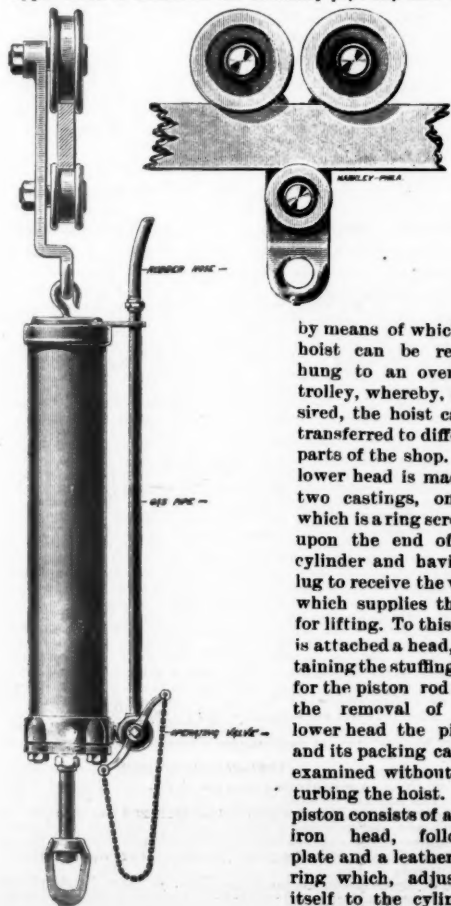
This type of compound can be run as a simple engine in case of breakdowns, with no more trouble than an ordinary engine.

No. 2,600 has so satisfactorily met all requirements of heavy and fast express service, that have been placed upon it for several consecutive months, that the builders believe themselves justified in claiming, as a conservative estimate, a saving of 15 to 25 per cent. fuel in express service in competition with a simple locomotive, the amount of saving depending on the service.

Pneumatic Hoist.

Messrs Pedrick & Ayer, of Philadelphia, are making a line of pneumatic hoists for lifting and moving light weights or loads, a view of which is herewith shown.

The cylinder is small and of extra strong wrought iron pipe carefully reamed to a true and smooth bore. To the upper head is fastened an ordinary pipe cap and hook



by means of which the hoist can be readily hung to an overhead trolley, whereby, if desired, the hoist can be transferred to different parts of the shop. The lower head is made of two castings, one of which is a ring screwed upon the end of the cylinder and having a lug to receive the valve which supplies the air for lifting. To this ring is attached a head, containing the stuffing box for the piston rod; by the removal of the lower head the piston and its packing can be examined without disturbing the hoist. The piston consists of a cast iron head, follower plate and a leather cup ring which, adjusting itself to the cylinder, prevents all leakage.

TABLE NO. 6.

GENERAL DATA AND RESULTS OF TESTS ON NEW YORK, PROVIDENCE & BOSTON R. R.

Schedule running time, train No. 39.
Providence to New London, 64 miles . . . 1 hr. 35 mins.Schedule running time, train No. 50.
New London to Providence . . . 1 hr. 35 mins.

TRAIN NO. 39—WEST.						TRAIN NO. 50—EAST.					
Engine.	Date, 1891.	Running time Prov. to N. London.	Average speed in miles per hour.	Car mileage.	Train weight, empty, tons.	Remarks.	Running time, N. London to Prov.	Average speed in miles per hour.	Car mileage.	Train weight, empty, tons.	Remarks.
N. Y. P. & B.—34.	April 6	H. M. 1:29 1/4	43.58	384	...	5 slow-ups. Fire turned over at about 9 o'clock in morning to move engine around. Some coal was used.	H. M. 1:25 1/4	45.77	384	...	4 slow-ups.
	7	1:32	42.40	384	...		1:30 1/4	43.10	384	...	2 slow-ups. 2 extra station stops.
	8	1:30 1/4	43.10	384	...	3 slow-ups.	1:28 1/4	44.06	384	...	4 slow-ups.
	9	1:28 1/4	44.06	384	...	4 " "	1:27	44.82	384	...	3 " "
	10	1:32 1/4	42.20	384	...	4 " "	1:29	43.83	384	...	2 " "
	11	1:33 1/4	41.72	384	...	5 " "	1:23 1/4	46.76	384	...	2 slow-ups. Whistle leaked quite badly. Fire banked and kept till Monday. Weighed back
				2,304					2,304		Total am't coal burned during tests
											31,866
Compound, 2,600.	20	1:26	45.35	384	...	3 slow-ups. Fire turned over at noon to move engine around, then banked.	1:26	45.35	384	...	2 slow-ups.
	21	1:33	41.93	384	...	3 slow-ups. Fire turned over at noon to coal up engine, then banked.	1:26 1/4	45.13	384	...	2 slow-ups.
	22	1:29 1/4	43.58	384	...	3 slow-ups.	1:26 1/4	45.13	384	...	2 slow-ups.
	23	1:32 1/4	42.20	384	...	3 slow-ups.	1:30	43.33	384	...	2 slow-ups.
	24	1:30 1/4	43.10	384	...	4 " "	1:31	42.87	384	...	2 " "
	25	1:32 1/4	42.47	384	...	4 " "	1:22 1/4	47.27	384	...	Weighed back
				2,304					2,304		Total am't coal burned during tests
											27,193

No. of regular stops, train No. 39—1.

No. of regular stops, train No. 50—1.

SUMMARY.

Engine number.	Total car mileage.	Total coal consumption.	Average amt. of coal used per car mile.	Percentage of coal saved.	Average running time.		Average miles per hour.	
					Prov. to N. London.	N. London to Prov.	Prov. to N. London.	N. London to Prov.
34	4,608	15.9 tons.	6.9 lbs.	14.52%	1 hr. 31 mins.	1 hr. 27.3 mins.	42.84	44.72
2,600	4,608	13.56 "	5.9 lbs.		1 " 20.7 "	1 " 27 "	43.04	44.84

WATER ACCOUNT.

Engine number.	Evaporated in boiler.	Used in cylinders.	Pounds evaporated per pound of coal.	Percentage water saved, used in cylinders.
34	25,140 gallons.	25,067 gallons.	6.59 lbs. from 43.2°	
2,600	23,812 "	23,706 "	7.30 " " 53.25°	5.5%

The lower end of the piston rod has a swivel loop for taking hold of the work. The admission of compressed air raises the piston and its load; the release of the air lowers it.

The parts of the hoists are all strong and substantial. Those taking the strains are of steel or wrought iron; the upper and lower heads are of cast iron. The hoists made range from 3 in. diameter and 450 lbs. capacity to 8 in. diameter and 3,200 lbs. capacity. The air pressure required for such capacities is 80 lbs. per sq. in.

Car Heating by the Acetate of Soda Method.

In a recent issue of *Les Annales des Travaux Publics* a number of illustrations showing the acetate of soda car heating method adopted on the trains of the Holland railroads in accordance with the plans of M. Scholte, engineer of the car heating department are given. The broad principle underlying the soda method, as is generally known, is that, in fusing, the acetate of soda takes up a certain quantity of heat which, in great part, is again liberated when the soda re-crystallizes on cooling. Fusion of the soda takes place at a temperature of about 120 degrees C., and during the next 2 1/2 hours it cools gradually from 120 to 50 degrees, re-crystallizing and giving up its latent heat. The final temperature of 50 degrees C. is maintained for an additional period of about three hours, so that, altogether, the entire period of heating covers about six hours. In the soda process, as used on the French railroads, the receptacle containing the salt is hermetically sealed, and the recrystallizing process, on cooling, thus goes on within a confined space. M. Scholte, however, has recognized the importance of air in crystallization and, therefore, after having fused the soda, for an instant opens an air cock on the soda receptacle. This lets in enough air, he thinks, to assist in proper crystallization. In the process, as practiced in France, moreover, the fusion of the salt is effected by plunging the soda receptacle, which consists of sheet iron, into a bath of boiling water and leaving it there for from about three-quarters of an hour to an hour. M. Scholte, on the other hand, fuses the soda by means of steam under pressure, which is introduced through a copper pipe coil in the soda receptacle. This, it is claimed, permits an even distribution of the necessary heat for fusion, as against the simple surface heating attainable by the French method. M. Scholte has also perfected his arrangements so that it is not necessary to remove the soda boxes from the cars when they are to be heated. They can be left in their places and heated by coupling on a steam-pipe from the outside.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

In another column we give an account of the tests made of the Rhode Island Locomotive Works express locomotive on the Boston & Albany and the New York, Providence & Boston railroads, and also a description of the engine and its intercepting valve. This engine differs from all other two-cylinder compound locomotives in this country, in having a means provided by which the engine may be worked just as a simple engine is, with an independent exhaust from each cylinder. This arrangement provides sufficient power at starting, and under any condition of service for a period of time or a distance from the starting point, which is at the will of the engineer. This is an important advantage. The construction of the auxiliary valve which gives this feature is not shown, but we suppose it is simple and not liable to derangement. As might be expected, the saving shown by this engine is considerable under fair conditions, as the cylinders are large in proportion to the work to be done. In the *Railroad Gazette*, Oct. 2, we gave a table of comparative numbers showing the relative cylinder capacities in proportion to the work done by various compound locomotives in this and other countries. Those numbers varied from 32.8 to 71.2. With the Rhode Island compound, the number is 43.6. We expect to give further data shortly regarding the action of the steam in these cylinders at high speed. Of course this feature will be looked at with great interest, as there has been trouble with the majority of compounds yet built in securing a satisfactory steam distribution at high speed.

The Erie has resumed the interchange of tickets and baggage with the Chicago & Alton, the new general passenger agent giving notice to that effect on Monday of this week; and the "boycott" is apparently on its last legs. Rumors from Chicago have foreshadowed this outcome for a week or more, but the reason for the suddenness of the Erie's action is not wholly clear, and its competitors say it was bound to give a month's notice before taking it. The causes of the weakness of the agreement of the trunk and central traffic lines are thus summarized:

Commissions were paid in intermediate territory and the committee could not, by the terms of the agreement, inflict a penalty. Managing officials claimed that they could not be disciplined when agents sold tickets on commission. Participation in commissions by lines south of the Ohio to Western agents of competing lines south from Chicago and St. Louis led to justification of payments in trunk line territory. New England roads with lines north of Lake Ontario affected rates on competing lines south of Lake Ontario.

It appears that the agreement of Jan. 9 was concurred in unconditionally by 37 roads; by 27 roads reluctantly, conditions being stipulated; while 16 lines of the Central Traffic system did not respond, and all the New

England lines refused to act at all. The Chicago, Burlington & Quincy seems to have precipitated the break, as, although its officers have denied that they sent the Eastern lines any threats, it has doubtless complained very loudly that it was not receiving its share of the business from the East. News of this leaking out, promises of commissions to Eastern agents began to be too numerous to be ignored. It is reported that many of the roads west of Chicago have promised to pay for the 10 months since payments were discontinued, but this seems doubtful. It is more generally believed that the offers take effect Dec. 1.

The Richmond & West Point Terminal now enters on a new chapter in its checkered and eventful history. This epoch is marked by the recent circular issued by the President, wherein he practically confesses the incompetency of the management and proposes an abdication in favor of nominees to be selected by a committee named in the circular. It is singular that such a radical proceeding, and the proposed transfer of so great a property to the control of its business rivals, should have excited so little comment from the press, or attention from the shareholders. In estimating the probable results of the policy recommended by President Inman it is well to examine the personality of the committee to whom great autocratic powers are to be entrusted. The Chairman, Mr. Ex. Norton, was until very recently president of the Louisville & Nashville, which line is the most active competitor of the Terminal System in the Southwest. Mr. Schiff is a member of the banking firm of Kuhn, Loeb & Co., and has been for many years closely identified with the Norfolk & Western, as the chief supporter of its financial fabric. Mr. Salomon, of Speyer & Co., is a close associate of Mr. Schiff. The remainder of the committee are presidents of trust companies, presumably creditors of the company and with no permanent interest other than to secure the payment of loans due them. It is notorious since the recent construction of the Clinch Valley extension of the Norfolk & Western, whereby it was united with the Louisville & Nashville system, that a very close alliance has followed between these two railroads, and they have tried every means to send business over the new route between the south and the east, at the expense of the Terminal System. It bodes ill for the interests of the latter that the committee selected are the very men who are responsible for the policy of close alliance of the Norfolk and Louisville systems. It is to be noted that these arbitrators of its destiny admit that they have no moneyed interest in the property committed to them, give no promise or hint as to the use they will make of their authority, and are in fact voluntarily endowed with the control for which they proposed some years ago to pay several millions of dollars. There may be some significance in the fact that the market quotations of Louisville & Nashville securities have appreciated since the issue of Mr. Inman's circular simultaneously with the decline in Terminal securities. At the stockholders' meeting of the Terminal company in Richmond, Dec. 8, the majority of the stock is said to have been represented by proxy and to have confirmed the recommendation of Mr. Inman; that it should have been possible to secure the proxies shows how supine must be the indifference or how complete the ignorance of the stockholders. The property involved comprises 8,500 miles of railroad with securities aggregating over \$800,000,000. It is the possibility of such dramatic and revolutionary transfers of the interests of railroad proprietors that from time to time startles the foreign investor and leads him to class all American railroad investments as "extra hazardous." The outcome of the Terminal fortunes will be awaited with interest, but under the conditions above outlined it can hardly be a satisfactory one to the stockholders.

We publish in this issue a table showing the distribution of steam in the Dean compound locomotive on the Old Colony. Besides being interesting as an example of compound locomotive practice, this table is of value as showing the port openings and point of compression in recent locomotives with the Stephenson link motion. It will be noticed that the cutoffs are well balanced, being slightly longer on the piston rod end. Probably the most instructive column is the one relating to the port openings. It is to be seen that the opening of a locomotive slide valve with a 6-in. travel and 1-in. outside lap is only $\frac{1}{11}$ of an inch at $\frac{7}{8}$ cutoff. This is but a small fraction of what is really needed, and shows the inadequacy of the Stephenson link gear when applied to high speed engines. This opening, small as it is, is larger than is usually obtained. Some time since we gave the amount of open-

ing obtained on the Reading Railroad with 7-in. travel and $\frac{1}{2}$ -in. outside lap. See *Railroad Gazette*, Oct. 4. That is $\frac{1}{4}$ in. for 6-in. cutoff. The difference between these openings is almost entirely due to the difference in travel and width of lap. Altogether, the valve arrangement on the Old Colony engine is a good one, and we may expect some useful indicator cards.

Every superintendent will be interested in the extracts which will appear elsewhere from the new train rules of the Lake Shore & Michigan Southern. A code of rules is in one sense only a skeleton, and there is an appearance of dealing with the shadow instead of the substance when discussing it, but it is not, after all, a mere hand-book for new men; it is often of vital importance to old men also, as the flange of a wheel is important on straight lines as well as on curves. Even if the problems that arise when one examines it are all imaginary, it cannot be said that the officers of the operating department who spent many days in preparing the book, looked upon them as imaginary, and the time spent by them upon the work warrants others in studying it. This book is comparable only with the best codes heretofore issued. There are some unnecessary rules, which imply that other rules have not been properly impressed upon the mind of the trainman, and it seems rather superfluous, after more than half a century of experience, to specifically caution station masters not to send out an engineman or trainman who is under the influence of liquor; but in general the work is excellent, and it abounds in good points for others to copy. Indeed, in speaking of this liquor rule we are not criticising the Lake Shore in particular, for such rules are common; it is noticeable here only because there are so few other questionable ones. The most important question concerning the arrangement of rules in a code, especially for everyone interested in the American Railway Association, is that suggested in connection with rules 600-634 in our account of this book. The standard code of the Association proves too brief for every road that uses it and it is likely, some time, to be enlarged; this being the case, every rule that is of a general nature should be studied with reference to its fitness to be included in the standard code. For example, the Lake Shore prints rule 10, prescribing badges and uniforms, and then, in rule 608, repeats the same matter very much amplified. This distinctly weakens the effect of the very first chapter of the standard code, in the mind of every employé who is interested in rule 608. Other rules, bearing more directly on the safety of trains, exhibit the same conditions. The advantages of uniformity are great, but it is not right to sacrifice everything to them. It is to be hoped that some one will add more supplements to rules 1-121 than have yet been added. The English roads, which use the Clearing House standard, print unstandard rules in italics, and some books have whole pages of italicized rules. This independence is in many cases commendable, but American printers can suggest a more tasteful way of carrying it out; the italics not only present a bad appearance, but give a fictitious importance to the rules.

A Group of Collisions and the Moral.

The collisions at Toledo, Tarrytown, Pennington and East Thompson* ought to give a decided impetus to

* Nov. 28, 5 p.m., on Lake Shore & Michigan Southern, in the yard at Toledo, O., about midway between Air Line Junction and the Union Station, eastbound passenger train No. 6, which had been stopped by a blockade of freight trains in the yard, was run into at the rear by Flint & Pere Marquette passenger train No. 100, which followed it very closely from the junction. The rear car of No. 6 was badly wrecked, the engine penetrating it for 10 or 15 ft., and nine passengers were killed, some of them being scalded by steam which escaped from a broken pipe on the engine. About 20 other passengers were injured. It appears that the two miles of the main line between the junction and Toledo station are included in the yard limits. The rule in yards is that every engineman shall be able to stop his train within the range of his vision. The rear end of train No. 6 was stopped about 180 ft. east of a tunnel 75 ft. long, and it seems that there was more or less smoke in this tunnel, so that the runner of the P. & P. M. train could not see far ahead, and the brakeman of No. 6 was afraid to enter the tunnel, lest he should in the darkness be unable to keep out of the way of the approaching train. He was ordered by his conductor to get off with his red light just before entering the tunnel, but was unable to comply until after he had passed through it, it being regarded as dangerous to get off in the tunnel.

Dec. 1, about 7 p.m., on New York Central & Hudson River, at Tarrytown, N. Y., a northbound local passenger train was run into at the rear by an express, wrecking the rear car, from which the passengers had all alighted. The rear car crushed the one in front of it quite badly and a few passengers received slight hurts. One passenger in the express train was injured. It appears that there is a distant signal worked by hand, which should have stopped the express. The reports say that the stationman claims that this had been pulled to danger by him, while the engineman claims that it showed all clear.

Dec. 3, about 5 p.m., on Philadelphia & Reading, near Pennington, N. J., a southbound express train, traveling at high speed, ran into the caboose of a gravel train which was just going upon a siding, killing three sectionmen and the engineer of the express, and injuring 15 passengers and several employes. The engine of the express was overturned and thrown down an embankment, and the first passenger car was partially overturned.

Dec. 4, about 6:30 a.m., on New York & New England, at East Thompson, Conn., an eastbound freight train, traveling on the westbound track, struck a branch freight switching on the main track of the main road, there being a dense fog at the time. The wreck blocked both main tracks, and the east-

the movement for the introduction of the block system, for every one of them is a strong argument in this direction and affords very little instruction in any other. The more we add experience to experience the more culpable is each succeeding neglect and the weaker are the old arguments. After such cases as Mud Run and Palatine Bridge; Shoemakersville, Ravenna and Montezuma, superintendents issue new circulars or revamp old rules, and trainmen are supposed to either get for themselves or to acquire from the new circulars more or less increase of vigilance; and it is doubtless true that many conductors and engineers do actually learn something from these lessons given by other people's experience; but we do not have time to congratulate ourselves on the progress thus made before a new collision compels the conclusion that the best possible use of these object lessons still leaves us with poor protection, and that a radical change in the system is the only improvement, in protecting trains from collisions, that promises decided results.

That each new blunder evidences increased culpability is apparent from the fact that each case is due to some kind of carelessness that has shown disastrous results before, and from the additional fact that well-known remedies for this carelessness are shown not to have been applied. One of the simple lessons to be learned every few weeks (every few weeks from the newspapers; every day on some road) is that collisions occur by reason of negligence that has become a habit; and yet it was testified in the inquiry at Toledo that engineers habitually disregard the rule requiring them to run under control over that part of the road where the collision occurred. There was a strenuous contest before the Coroner in this case, the lawyer for the Flint & Pere Marquette evidently working hard to throw the responsibility upon the Lake Shore train, but the evidence, as published, shows that the F. & P. M. engineer clearly disobeyed the explicit rule requiring him to be able to stop within the range of his vision, while the rear brakeman of the preceding train at the worst disobeyed only a rule requiring in general terms that he protect the train to the best of his judgment. If the responsibility rests upon the Lake Shore Company it is evidently not because of any fault on train No. 6, but because it tried to run trains at 30 miles an hour and very close together, under rules which demanded either lower speed or a longer interval.

At Pennington the conductor of the work train tried to run too close upon the time of the passenger train. This is not an unusual dereliction, but this same man is said to have committed the same offense more than once before, which confirms the force of the argument just cited. The special criticism most obviously applicable to the company in this case is based on the fact that it runs trains at sixty miles an hour under the same regulations that were adopted when the maximum speed was only about three-fourths as high as now. The fact that engines and cars are now heavier and wrecks consequently more costly is an incidental moral of this case, but one that seems also to be generally without effect.

But all these arguments about training conductors and engineers so that they will improve their habits in regard to obeying rules—so that they will clear the track 10 minutes ahead of an express even when it does not seem to them necessary, and run under control even when they feel sure that the preceding train will send out a flag—seem futile after they have been disregarded so many times, and it becomes necessary to look in some other direction for a way of preventing collisions. The block system is the only other way practicable, and even if it were not we find a convincing reason for turning at once to that system for the desired improvement in the fact that experience has already shown that that system will at once produce a decided improvement with the same grade of men. There is no question that certain roads make a better record than certain others, simply because they employ more careful men, and the bare fact, without argument, should show that the latter ought to follow the example of the former; but as long as they will not follow it the public should demand the adoption of the block system.

At Tarrytown there is a station distant signal, and trains on that portion of the road are certainly not so infrequent that the conductor can have forgotten that the time interval was his most important rule; but if, under these circumstances, hundred-thousand-dollar trains, in the hands of old employes, crash together,

bound Long Island express (on its regular track) ran into it, killing the engineer and fireman. This train was followed by the steamboat express, which ran into the rear of it, doing slight damage, but apparently starting the fire in the sleeping cars which burned up a part of the wreck. A passenger in one of the sleeping cars is said to have been burned to death, though there seems to be some dispute about it. Four employes and another passenger were injured. The fire burned two passenger and four or more freight cars.

the only hopeful method of improving the discipline would seem to be the establishment of block signals (home and caution) close enough together to force the adoption of regular habits in setting and observing them.

The East Thompson disaster is the most dramatic of the list, but its causes were very commonplace, after all. The eastbound freight on the north track slackened speed on approaching the yard, but did not slacken quite enough. The derailment of a train by the occurrence of a wreck on an adjoining track, too late for a flag to be sent out, is reported about every month; nothing unusual about that. The second passenger train was not flagged in season, because the flagman was thrown to the ground and stunned. This statement implies that he was riding on the steps, and the excuse is one that is sometimes made fraudulently, but the combination is not to be regarded as an unexpected one. It may be argued that the New York & New England has not sufficient traffic to warrant the establishment of the block system: that the Reading, with its very fast trains, the New York Central and the Lake Shore, with their trunk line traffic, are proper fields for such an improvement, but that a smaller business must be conducted on narrower lines; but the ready answer to that would be, Run passenger trains half an hour apart instead of ten minutes.

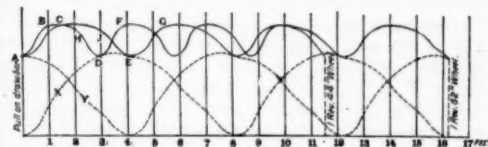
Possibly American railroad directors and managers are acting strictly in accordance with public sentiment in waiting until there is a measure of public excitement about the dangers of passenger travel before they take important measures to ameliorate those dangers; perhaps the majority of passengers would rather have lower fares than enhanced safety—until more of them are killed. But if this be so directors will do well to ask themselves who will be the worst sufferers in the end. Experience teaches that financial losses like those on the Old Colony in 1878, the Lehigh Valley in 1888, and the Erie and the West Shore this year strike, like lightning, where least expected; and whenever public opinion becomes sufficiently settled to take action it is liable to disturb the railroads financially much more than in the matter of freight car couplers. It has already taken such action in England. The disturbance there affected chiefly the smaller roads, as the larger ones had exercised sufficient foresight to prepare for the law compelling block signals and interlocking; but here the large roads, with a very few exceptions, have been no wiser than the small fry over there.

Starting Power of Large and Small Wheel Locomotives.

The experience of locomotive runners is essentially the same regarding the starting powers of large and small wheel locomotives. When the cylinder power for two engines, in proportion to the diameters of the drivers and the weights on them, is the same for both, the one with the smaller wheels will pull the heavier load out of a bad place, such as a crooked siding with bad tracks. This fact has been much disputed by those who have held that equal starting powers are obtained when the cylinders are made in the same proportion to the diameter of the wheels and the weights. This, like the proper opening of a throttle lever, the wetness of the steam and the counterbalancing of the engine, is a matter which is best settled and best proved by experience. There are conditions under which it is better to run with a partially closed throttle, and however closely a counterbalance may be calculated, yet the effect of any system of counterbalancing on a given engine can only be determined by trial, as the total weight of the engine and the location of the parts have much to do with the exact result. It is not easily seen why two locomotives having the same weight on drivers and the same cylinder power in proportion to the wheels should not draw out of a bad place the same load with equal facility. We have made an analysis of the hauling power at each point of a revolution for a small and a large wheel to show wherein the difference lies. If it is true that the engine with the small wheel can start a heavier load than the engine with a large wheel, then it can be proved.

If two engines have the same weight on drivers and the cylinders are in proportion to the wheel diameters, then the maximum, minimum and average pull which can be exerted by the two engines will be the same for both. Each revolution of the drivers will give four maximum and four minimum points of tractive power for each engine; but in the case of the engine with the small wheel, the maximum points, as well as the minimum, will be closer together, and the momentum of the train may be sufficient to keep it in motion from one maximum point to another in the case of a small wheel, where it might not be sufficient

with a large wheel. This is perhaps best shown by the diagram, which is drawn for a comparison of two locomotives with the same weight on drivers with cylinder power in proportion to the diameter of the wheels, one set of drivers being 44 in. in diameter, and the other 62 in. The vertical lines of the diagram are spread one foot apart and represent one foot of track, while the height of the curved lines above the base represents the pull on the drawbar at different points of the track during one revolution. The curves start together at A both at the same minimum pull on drawbar, but with a small wheel the maximum pull is reached at B some distance in advance of the maximum pull for the large wheel at C. The minimum is found at D for the small wheel and at E for the large wheel. The distance from one point of maximum pull with the small wheel to the next maximum, say from B to F, is considerably less than the distance from C to G with the large wheel, and the momentum of the train,



which is obtained by running up on the slack between cars, might often carry the train over from H to F, while it would not do so from J to G. The line from A to B rises much more rapidly than from A to C, showing that if the locomotive attempts to start at a minimum point of pull its power will more rapidly increase with a small wheel than with a large wheel.

It may be argued that if both locomotives were to start at B and C, the points of maximum pull, the large wheel engine would have an advantage, as the period of maximum pull is longer with the large wheel engine. This is true; but it is not at the point of maximum pull that there is difficulty in starting the train. It is at the point of minimum traction that the difficulty is experienced, and it is probably only during the first two revolutions that this argument applies in any case. To start a freight train when it is in a bad place it is necessary to get the maximum pull as quickly as possible and store sufficient energy in the train by the time the slack is taken up to carry the train over the point of minimum pull, and this is accomplished by the use of small wheels to a greater extent than with large wheels, as shown by the experience of locomotive runners and by the diagram herewith. This is not an argument for the use of small wheels, but simply a statement of comparative starting power.

Cable Road and Rapid Transit in Chicago.

The trouble in Chicago with the cable roads has reached a climax, and those who have been offering these roads as an example of what an ideal rapid transit should be will have to find another illustration. The fact is these roads have nearly reached their limit, and something more will have to be done. The case is about as follows: The number of cars run during the morning and evening hours is enough to furnish seats for perhaps one-quarter of the passengers. The remainder have to stand in the aisles or hang on to the handles on the outside of the cars. This, of course, puts the passengers on the outside in a dangerous position, as it is not uncommon for cable cars to collide with teams and obstructions in the streets. In the tunnels seven people have been killed or seriously injured in the past month, which would not have happened if a sufficient number of cars had been put on to enable passengers to stand on the platforms instead of on the steps. With such crowds, all regulations, both of the street railroad companies and of the city, about standing on the steps have no meaning. During the middle of the day the passengers are not allowed to stand on the steps, but during the crowded hours there seems to be no way of preventing it; the conductors have as much as they can do to collect fares and let passengers on and off. Strangely enough, the grip cars are not protected by gates or railings; this must seem reckless to those who live in cities farther west where such precautions have been taken from the first starting of the cable and electric roads.

One ordinance proposed is that a fare shall not be collected from any passenger unless he is provided with a seat; a fine for this is proposed at not less than \$25 nor more than \$50 for each offense. Another is that the Superintendent of Police be instructed to place an officer at certain points to report upon the number of passengers carried, the number standing, and the number of cars run per hour at different times during the day. Still another is to charge only 3 cents for passengers who are compelled to stand and 5 cents for those who are provided with seats. Probably none of these will suffice; but something will be done that will bring the railroad companies to the realization of the fact that they are in possession of a valuable franchise and have in their hands the comfort of the traveling public.

Heretofore as many cars have been run in the

middle of the day, when there is but little traffic, as at night and morning, when the traffic is at least ten times as great. Recently there has been an increase in the number of cars per hour during the busy portions of the day. Public sentiment compelled the companies to take this step, but before they could do so they had to get the consent of the conductors' and drivers' unions. These unions had an agreement with the street railroad companies which prevented those companies from putting on an extra trip, unless the conductors and gripmen were paid for a full day's work.

The cable companies cannot say that they cannot afford to make the needed improvements, as their stock is worth from 200 to 300 per cent., and a small decrease in the dividends paid would give the public the better lights, better ventilation and cleaner cars which they demand. A comparison recently made between the North and South Side cable systems shows that the number of night cars run on the North Side is only one-third of that on the South Side, and a careful observer will note one necessary and obvious change; that is in the management. The details are not properly looked after. The cables, the grips, the starting of the cars, and the bunching of trains, are all handled with inefficiency if not recklessness. Not long since a serious delay of several hours was caused by a broken grip, an examination of which revealed a crack which ought to have been discovered when the grip car was passed through the house on its preceding trip. The crack had the appearance of having been in existence several months. On the South Side most of the difficulty results from parsimony. It is seldom that anything happens on the South Side that costs the company money, but the passengers have to ride in the dirty, noisy and dark cars. When the ground is frozen, the noise made by the rattling of the guards around the wheels, the windows and doors is abominable, while the lamps are of an inferior design.

The other side to all this is that the railroad companies find themselves in a predicament. The rapid wear of the cables and the breaking of the grips make a limit beyond which they cannot go. For instance, when these cables were first put down they were made of a given size, the same as is used on nearly every cable road in the United States. The traffic has increased many times, yet the same size of cable is still used. To crowd more cars on to these comparatively small cables would only result in worse trouble from an increased number of break-downs. Scarcely a day passes in Chicago without a delay caused either by a broken grip or cable. These delays last from one to four hours, according to the extent of the damage, and they invariably happen at the busy hours when there is a heavy pull. The breakage of one grip or cable will stop the entire traffic on three or four miles of road at a time when the working people are hurrying to business. If this were only an occasional occurrence it would be forgiven with a true western spirit; but it happens frequently, as any one who reads the Chicago papers may notice.

A conclusion from this is that cable roads are a considerable failure in Chicago as they are now managed. They are neither sufficient for the traffic nor comfortable for the passengers. There is a limit to the number of cars which a given cable can carry, and therefore a limit to the capacity of the road, which limit is not found, as it should be, in the least allowable distance between trains on the street. To use a larger cable is impracticable without an entire change in the diameters of the carrying pulleys, considerable changes in the engine house and a renewal of the grips. The fact is that the cable now used is as large as is economical. A large cable wears more rapidly, offers a greater resistance to bending, and too large a percentage of power is required to drive the cable itself when the traffic is light. As it is no cables are run after 12 o'clock, and even the longest lines have to resort to half-hourly trips with horse cars.

One of the most serious troubles, and perhaps the most difficult to overcome, is the liability of a large percentage of all the cars on a cable to start at the same instant. If one starts and then another, and so on, until all have started, the strain upon the cable is not more, perhaps, than it can withstand; but if 90 per cent. of all cars are starting at the same time, the accumulated stress is so great that the cable breaks. This concentration of loading is not generally understood, and many times when a breakage is explained by assuming that the cable is weak, the true cause lies in this simultaneous starting. The cables being almost exactly uniform from end to end weak points are well nigh impossible to find.

From a cursory examination of the Chicago system, one must conclude that a cable road is useful only within narrow limits. It is not an economical road unless it has a large traffic, and yet it is not a convenient road if the traffic is too large. It cannot be crowded beyond a certain point owing to the limitations of the cable itself, and it is too expensive to run unless a sufficient number of cars can be operated to reduce the percentage of power required to drive the cable itself. Engineers who are enthusiastic defenders of cable systems have now a chance to show what is the matter in Chicago, and why it is that those roads cannot be operated more efficiently. The conditions there are such as have always been claimed to be most favorable to the successful operation of cables, yet the results are far from satisfactory.

Annual Report.

New York & Brooklyn Bridge.—The Trustees have issued their report for the year ending Dec. 1, 1891. The whole number of passengers was 41,268,370, showing an excess of 369,886 over the number reported last year. The comparison of receipts is as follows:

	Promenade.	Carriage-ways.	Railroad.	Total.
For 12 months ending Dec. 1, 1890....	\$18,611.68	\$76,465.59	\$1,032,011.23	\$1,127,094.50
For 12 months ending Dec. 1, 1891....	\$8,221.02	79,255.59	1,088,971.34	1,176,447.95
* Six months only on the promenade.				

The comparison of traffic is as follows:

	Promenade.	Railroad.	Total.
Passengers for 12 months ending Dec. 1, 1890....	3,222,073	37,676,411	40,898,484
Passengers for 12 months ending Dec. 1, 1891....	1,502,327	39,766,043	41,268,370
* Six months only on promenade.			

The receipts from all sources were \$2,085,462 and expenditures \$1,732,281; balance, \$353,181. The disbursements for real estate for the terminal improvements were \$454,356, and with legal expenses, material, labor, etc., amounted to over \$517,000. There remains to be acquired property valued at \$229,000, which the Trustees are unable to pay for and meanwhile the work of improvement is interrupted. There is a large amount of steel material now in the hands of the contractors ready for delivery on which interest will have to be paid. The Trustees recommend legislation authorizing the sale of bonds at less than par or at more than three per cent. interest, to get funds to relieve this situation.

The total delays to trains from all causes was 7 hours 36½ minutes during the year; and the delays because of failures of the grip to act aggregated 2 hours 57½ minutes out of the 7,300 hours the cable was run. The following interesting figures of the service of the cables are given. In the eight years and more the railroad has been operated, six hauling cables have been used. Of these, four have been worn so as to necessitate their removal, and two are now in service, one being employed to haul the trains, and the other held in reserve; change being made from one to the other, as may be required by the conditions of use. The record of cable service up to Nov. 1, 1891, is given in the following table which exhibits a term and amount of work done by each cable, unpaired on ordinary cable railroads.

Cable.	Condition.	Service days.	Miles.	Ton miles.	Average Number of tons.
No. 1.....	Worn out.	1,140	228,329	22,142,706	97.
" 2.....	"	607	120,232	25,492,892	212.03
" 3.....	"	383	82,099	30,385,073	248.42
" 4.....	"	359½	74,111	18,923,467	255.3
" 5.....	In use.	276½	58,881	16,746,912	284.1
" 6.....	"	187	39,989	12,566,413	312.8

Contracts have been made for the material and erection of the extension of the roadways in New York, and of the platform in Brooklyn, for duplicate boilers and cable-hauling machinery; and for the roofs and other metal parts required for the extensions of the power and boiler houses. The walls for these houses and the foundations for the machinery are now being erected, and will be completed soon.

The proposed addition to the cable driving plant will allow for four cables, of which two at all times will be ready for use—and the machinery in all its parts will be in duplicate. To complete the plans for doubling the capacity of the railroad, duplicate tracks are to be laid the entire length of the line and quadruple tracks in the new stations, so that during the busy hours and at other times when the traffic demands it, two cables, one for each track, may be operated.

The scarcity of freight cars has now become general, and a rise of four cents a bushel in corn at New York this week is attributed principally to this cause, though the recklessness of buyers in making contracts, regardless of well known limitations of transportation facilities, is a more rational explanation of a large share of the advance. Ocean vessels are short and storage facilities are overcrowded, so that the trouble is not all with cars. The stocks of grain at eastern Lake Erie ports are enormous, and it is estimated that the trunk lines from these ports can use all their cars for a month on this freight alone. This accentuates the scarcity at Chicago, and at the same time the roads west of there decline to let their cars come further east. Chicago and other centres are therefore crowded, and the pressure, in turn, falls upon the local shipping points. The railroad commissioners in Nebraska and other states are holding consultations on the subject, but it does not appear that they have discovered any new remedies for the difficulty, and the old remedies are just as good, and no better, than heretofore. The improvement effected by demurrage regulations and by building cars of larger capacity seems to be more than offset by the normal increase of business other than grain. The usual scarcity of coal cars in various regions west of the Mississippi is also reported. The towns apparently grow faster than new cars are provided, and little is done to avoid a glut of coal shipments at the beginning of winter, though it is said that one road made a reduction in rates during the summer. It looks as though such reduction ought to be made general and much larger.

The "Alley" Elevated Road in Chicago is now being completed to Congress street. Some time since the

work was stopped at Twelfth street to arrange for the right of way north. This has been secured, the material is on the ground, and the structure is being rapidly erected. Shortly this line will be completed from the northern terminus in the city to Thirty-ninth street, or about four miles. It is undecided yet whether it will be operated before the road is completed to Jackson Park or not. Those who are watching the development of the elevated roads in Chicago should not get the different roads mixed up. There are several projected, but only two are started. That on Lake street has practically stopped, and there is some question as to whether the structure will not be pulled down. It obstructs the light in the street and the foundations are unsatisfactory. The "Alley" Elevated road is that being constructed by the Chicago & South Side Rapid Transit Railroad Co., and is the one which promises to be first completed. It connects the city with the World's Fair grounds. Colonel Calvin Goddard is president, and Mr. R. I. Sloan, Chief Engineer. Mr. Sloan was for some years chief engineer of the Manhattan Elevated in New York.

The Rhode Island Locomotive Works have agreed to furnish to the Chicago, Milwaukee & St. Paul one simple and one compound engine of the 8-wheel type, which will be put in competition and be tested by the committee appointed at the last convention of the Master Mechanics' Association. It is reported that the railroad company will make the tests at its own expense. These 8-wheel engines have 62-in. driving wheels and the fire-box is between the frames. They weigh about 95,000 lbs. with 64,000 lbs. on the drivers. The single expansion engine will have 17 x 24 in. cylinders. The starting gear and the compound system will be the same as that on the experimental engine built by the Rhode Island Locomotive Works, which we describe in this issue.

NEW PUBLICATIONS.

Librito del Campo; con Tables Utiles adaptadas al Sistema Métrico para los Estudios y Construcción de Líneas Ferreas. Por Mac Gee, Ingeniero Civil. Buenos Aires; Imprenta de Galli Hnos. London. E. & F. H. Spon, 1891.

This title of this book may be translated "Field Book, with Useful Tables, adapted to the Metric System, for Surveys and Construction of Railroads, by John MacGee, Civil Engineer." The book is in Spanish and, as indicated by the title, all of the formulae and tables are arranged for the metric system. It contains chapters on preliminary and location surveys, on running out curves by various methods, on leveling and on construction. There are also chapters on spiral curves, with formulae and tables, and finally there are the usual tables of functions, areas, etc., to be found in American field books, with many special tables that are not usually contained in such works. On the whole the volume is one which must be of very great use to engineers in the Spanish-American countries, and in fact in all countries where the metric system is used. The following translation of a portion of the author's preface will give a notion of his reasons for publishing the book, which are based on long experience as a railroad engineer in South America.

"The tables for the calculation of the functions of circular arcs employed in the treatise on railroads are based on the *American system*, in which the angles of deflection measured by the theodolite, and the notation and calculations in the field-book are selected so as to avoid fractions of degrees as far as possible. In this way, fractional numbers result for the values of radii, which is no inconvenience, since in practice the radii are not measured. On the contrary, in the *European system*, the value of the angles is not an entire number; this makes the reading of the instrument very difficult and complicates the field notes and the calculations, though it results in entire numbers for the radii, since the latter are not measured on the ground.

"Taking into account that the European system is likely to be attended by confusion, complication and errors in the calculations and notes of the field-book, and, moreover, requires more time and labor in tracing curves than the American system, we believe the latter, for its simplicity and rapidity, will be readily appreciated by engineers engaged in such studies. We give below an example under each system.

"In the results of the movement of trains on a track, such as the resistance due to curvature, etc., a circular curve of 572.98 metres radius offers a resistance practically equal to that of a curve of 570 metres radius, and the difference in resistance, etc., between two curves whose respective radii are 1,145.93 and 1,100 metres is insignificant, but there is a great deal of difference in the labor of tracing them on the ground, as is easily seen in the following examples:

"By formula (1) we have these deflections:

For the radius of 570 metres = 1° 18.81'.	that is, 1° 19'
" " 572.98 "	" = 1° 19'
" " 1,100 "	" = 0° 31' 15.98"
" " 1,145.93 "	" = 0° 30'

"It is evident, then, that if we take into account the manipulation of the theodolite to describe the angles, the care and labor of noting them with their repetitions in the field book, and the facility with which errors may be made in the computations, we shall obtain a notable advantage over the European system by the American."

Mr. MacGee acknowledges his obligation for materials to the "excellent treatises of Searles, Trautwine, Henck, Shunk, Haswell, Clark, Nystrom, Passos, and various scientific periodicals."

The Working and Management of an English Railway. By George Findlay, General Manager, etc., etc. Fourth Edition, Revised and Enlarged. Pp. 354, 8 vo., with numerous illustrations and index. Price \$1.50. New York, Macmillan & Co., 1891.

In 1889, when the first edition of this little book appeared and we had the pleasure of reviewing it, we said that an astonishing amount of information had been compressed into the pages. In fact it is quite a little classic it is so compact, so full and so concise. The scheme of the book is to give an account of the history, the organization, the administration and the technical working of the greatest of the English railroads, and this scheme has been carried out with striking success. This new edition, which has been brought out at a greatly reduced price, is mainly from the same plates as the first edition but contains some additional matter. The chapter on the "Railways as a Means of Defense" has been much extended, and Mr. Findlay outlines the method of using the English railroads for carrying large numbers of troops and their supplies in a sudden emergency, and discusses their capacity for this purpose. A new chapter on "Passenger Traffic" has been added, in which Mr. Findlay sketches the development of English passenger business and gives statistics of the results of working. Finally he has added as an appendix a paper on "Modern Improvements of Facilities in Railway Traveling," which is perhaps the least valuable part of the book.

TRADE CATALOGUES.

Sketches of Hoisting and Conveying Devices Employed in Phosphate Mining. The Lidgerwood Mfg. Co., 96 Liberty street, New York.

This company publishes a little pamphlet containing illustrations drawn from photographs of some of its largest and most recent installations of conveying plant. The most remarkable one illustrated, perhaps, is that erected for the construction of the Austin dam, Austin, Tex. This cableway has a clear span of 1,350 ft. The main cable is 2½ in. in diameter and the load carried is seven tons. The Locke-Miller patent, horizontal cableway is also shown. This has a traveling carriage with a fall block, raised and lowered at the will of the engineer. The load is carried in self-dumping buckets hung from this block. The hoisting engines, cable carriages and other details are also shown.

Catalogue of the Star Headlight Co., Rochester, N. Y. Catalogue No. 2 shows a variety of headlights from 10 in. up. Also small electric lights for motor cars, as well as switch signal lamps, cab lamps, etc.

Steam Distribution in the Old Colony Compound.

The Dean compound on the Old Colony Railroad will shortly be put into fast passenger service for a test. As this engine has been designed with great care and under conditions which should lead to the best possible results in steam distribution, all will be interested in the indicator cards taken from the engine and in the steam distribution. No cards have been taken as yet, but the following table, which Mr. Dean has sent to us at our request, shows the steam distribution.

The valve travel is 6½ in. with 1 in. outside lap and ¼ inside clearance on each side. These dimensions are those with which the engine was originally constructed. They have not been changed since it was first put into service. The clearance in the high pressure cylinder is 10.6 per cent., and in the low pressure cylinder 6 per cent.

This engine continues to show a largely decreased fuel consumption when compared with the excellent ordinary engines which Mr. Lauder is noted for building.

TABLE SHOWING DISTRIBUTION OF STEAM, LOCOMOTIVE NO. 232 (COMPOUND), OLD COLONY RAILROAD.

Left Side (high pressure).						Right Side (low pressure).					
Forward.	Notch.	Lead.	Cutoff.	Release.	Suppression.	Port opening.	Forward.	Notch.	Lead.	Cutoff.	Release.
1	1	1	20%	22%	23%	13%	1	1	1	21%	22%
2	2	2	18	20%	21%	14%	2	2	2	19%	21%
3	3	3	16	18	19	15%	3	3	3	17%	19%
4	4	4	14	16	17	16%	4	4	4	15%	18%
5	5	5	12	14	15	17%	5	5	5	14%	17%
6	6	6	10	12	13	18%	6	6	6	13%	16%
7	7	7	9	11	12	19%	7	7	7	12%	15%
8	8	8	8	10	11	20%	8	8	8	11%	14%
9	9	9	7	9	10	21%	9	9	9	10%	13%
10	10	10	6	8	9	22%	10	10	10	9%	12%
11	11	11	5	7	8	23%	11	11	11	8%	11%
12	12	12	4	6	7	24%	12	12	12	7%	10%
13	13	13	3	5	6	25%	13	13	13	6%	9%
14	14	14	2	4	5	26%	14	14	14	5%	8%
15	15	15	1	3	4	27%	15	15	15	4%	7%
16	16	16	0	2	3	28%	16	16	16	3%	6%
17	17	17	0	1	2	29%	17	17	17	2%	5%
18	18	18	0	0	1	30%	18	18	18	1%	4%
19	19	19	0	0	0	31%	19	19	19	0	3%
20	20	20	0	0	0	32%	20	20	20	0	2%
21	21	21	0	0	0	33%	21	21	21	0	1%
22	22	22	0	0	0	34%	22	22	22	0	0
23	23	23	0	0	0	35%	23	23	23	0	0
24	24	24	0	0	0	36%	24	24	24	0	0
25	25	25	0	0	0	37%	25	25	25	0	0
26	26	26	0	0	0	38%	26	26	26	0	0
27	27	27	0	0	0	39%	27	27	27	0	0
28	28	28	0	0	0	40%	28	28	28	0	0
29	29	29	0	0	0	41%	29	29	29	0	0
30	30	30	0	0	0	42%	30	30	30	0	0
31	31	31	0	0	0	43%	31	31	31	0	0
32	32	32	0	0	0	44%	32	32	32	0	0
33	33	33	0	0	0	45%	33	33	33	0	0
34	34	34	0	0	0	46%	34	34	34	0	0
35	35	35	0	0	0	47%	35	35	35	0	0
36	36	36	0	0	0	48%	36	36	36	0	0
37	37	37	0	0	0	49%	37	37	37	0	0
38	38	38	0	0	0	50%	38	38	38	0	0
39	39	39	0	0	0	51%	39	39	39	0	0
40	40	40	0	0	0	52%	40	40	40	0	0
41	41	41	0	0	0	53%	41	41	41	0	0
42	42	42	0	0	0	54%	42	42	42	0	0
43	43	43	0	0	0	55%	43	43	43	0	0
44	44	44	0	0	0	56%	44	44	44	0	0
45	45	45	0	0	0	57%	45	45	45	0	0
46	46	46	0	0	0	58%	46	46	46	0	0
47	47	47	0	0	0	59%	47	47	47	0	0
48	48	48	0	0	0	60%	48	48	48	0	0
49	49	49	0	0	0	61%	49	49	49	0	0
50	50	50	0	0	0	62%	50	50	50	0	0
51	51	51	0	0	0	63%	51	51	51	0	0
52	52	52	0	0	0	64%	52	52	52	0	0
53	53	53	0	0	0	65%	53	53	53	0	0
54	54	54	0	0	0	66%	54	54	54	0	0
55	55	55	0	0	0	67%	55	55	55	0	0
56	56	56	0	0	0	68%	56	56	56	0	0
57	57	57	0	0	0	69%	57	57	57	0	0
58	58	58	0	0	0	70%	58	58	58	0	0
59	59	59	0	0	0	71%	59	59	59	0	0
60	60	60	0	0	0	72%	60	60	60	0	0
61	61	61	0	0	0	73%	61	61	61	0	0
62	62	62	0	0	0	74%	62	62	62	0	0
63	63	63	0	0	0	75%	63	63	63	0	0
64	64	64	0	0	0	76%	64	64	64	0	0
65	65	65	0	0	0	77%	65	65	65	0	0
66	66	66	0	0	0	78%	66	66	66	0	0
67	67	67	0	0	0	79%	67	67	67	0	0
68	68	68	0	0	0	80%	68	68	68	0	0
69	69	69	0	0	0	81%	69	69	69	0	0
70	70	70	0	0	0	82%	70	70	70	0	0
71	71	71	0	0	0	83%	71	71	71	0	0
72	72	72	0	0	0	84%	72	72	72	0	0
73	73	73	0	0	0	85%	73	73	73	0	0
74	74	74	0	0	0	86%	74	74	74	0	0
75	75	75	0	0	0	87%	75	75	75	0	0
76	76	76	0	0	0	88%	76	76	76	0	0
77	77	77	0	0	0	89%	77	77	77	0	0
78	78	78	0	0	0	90%	78	78	78	0	0
79	79	79	0	0	0	91%	79	79	79	0	0
80	80	80	0	0	0	92%	80	80	80	0	0
81	81	81	0	0	0	93%	81	81	81	0	0
82	82	82	0	0	0	94%	82	82	82	0	0
83	83	83	0	0	0	95%	83	83	83	0	0
84	84	84	0	0	0	96%	84	84	84	0	0
85	85	85	0	0	0	97%	85	85	85	0	0
86	86	86	0	0	0	98%	86	86	86	0	0
87	87	87	0	0	0	99%	87	87	87	0	0
88	88	88	0	0	0	100%	88	88	88	0	0
89	89	89	0	0	0	101%	89	89	89	0	0
90	90	90	0	0	0	102%	90	90	90	0	0
91	91	91	0	0	0	103%	91	91	91	0	0
92	92	92	0	0	0	104%	92	92	92	0	0
93	93	93	0	0	0	105%	93	93	93	0	0
94	94	94	0	0	0	106%	94	94	94	0	0
95	95	95	0	0	0	107%	95	95	95	0	0
96	96	96	0	0	0	108%	96	96	96	0	0
97	97	97	0	0	0	109%	97	97	97	0	0
98	98	98	0	0	0	110%	98	98	98	0	0
99	99	99	0	0	0	111%	99	99	99	0	0
100	100	100	0	0	0	112%	100	100	100	0	0

A Remarkable Fast Heavy Passenger Run on the Pennsylvania Lines.

On the 2d inst. a fast run was made with a very heavy train on the Cincinnati division of the Pittsburgh, Cincinnati, Chicago & St. Louis. The train weighed 892,500 lbs., or 446½ tons, and the maximum speed attained was 70 miles per hour, while the average speed between Xenia and Columbus, deducting time for

stops, was 50 miles per hour, or an average speed, including stops, of 43 miles per hour. The train was hauled by two engines. The leading engine, No. 218, was a 16 in. x 22 in. old type, while the second was a class "O" 18 in. x 24 in., No. 250. The maximum grade is 40 ft. per mile. The detailed weights of the train are as follows:

Locomotive No. 218	70,500
Tank	50,500
Locomotive No. 250	96,000
Tank	50,500
Two 12-wheel postal cars	120,000
One 8-wheel baggage car	40,000
Four 8-wheel coaches	175,000
Three 12-wheel Pullman sleepers	180,000
One 12-wheel Pullman dining car	60,000
One 8-wheel special car, No. 203	50,000
Total, 12 cars and 2 engines	892,500

The train left Xenia at 7:02 and arrived at Columbus at 8:18, a distance of 55 miles, in 1 hour and 16 minutes. Allowing 8 minutes for four stops the running time was 1 hour and 8 minutes, or an average of 50 miles per hour. The train left Richmond 10 minutes late, having been delayed by making up train and testing air brakes. Three minutes were lost in doing work at the Union Depot, Dayton. The train was 22 minutes late leaving Xenia, and 3 minutes late arriving in Columbus. Thus 19 minutes were made up during the run. An observer riding in the train states that the cars rode nicely, the speed reaching 70 miles per hour in places, which is probably the highest ever attained with a train of this weight.

Oil Tempered Crank Pins.

The Lehigh Valley Railroad Co. is using crank pins tempered in oil by the Harvey process, used by the Bethlehem Iron Co. for ordnance for the United States Government. What led to this step was the remarkable results of a test made with a broken crank pin before and after tempering. The pin tested had the following composition: Carbon .53 per cent., manganese .59 per cent., phosphorus .047 per cent., sulphur .0069 per cent., and silicon .17 per cent.

TEST OF DRIVER PIN, BROKEN JULY 31, 1891, ON THE ENGINE "IDLEWILD," NO. 416.

Diameter of specimen, inches.	Test.				Appearance of fracture.
	Tensile strength.	Elong. lim.	Per cent. of elongation.	Per cent. of reduction of area.	
.490	88,970	39.880	17.25	43.50	Irreg. grey cryst. specks.*
.490	85,165	39.880	17.25	43.50	Irreg. grey cryst. specks.*
.500	94,220	39.720	16.85	21.49	Cryst. grey spot on edge.*
.498	97,540	54.430	23.10	50.31	Dense grey.†

REMARKS.—* Specimens cut from pin received. † From piece of pin after boring hole 1 in. in diameter, and oil tempering and annealing.

The results of these tests were so satisfactory that ten locomotives built for the Lehigh Valley by the Baldwin Locomotive Works have been fitted with pins treated in this way. The chemical composition of the pins used for these locomotives is as follows:

Carbon	0.50
Manganese	0.60
Silicon	0.15
Phosphorus	0.035

Specimens ½ in. in diameter and 2 in. between marks, cut longitudinally from the pins after treatment, stood the following mechanical tests:

Tensile strength	112,040 lbs.
Elastic limit	61,170 lbs.
Elongation	20.55 per cent.
Contraction of area	45.53 per cent.

All the pins were bored so that the treatment might reach every part of the pin.

Car "Famines" in Germany.

A German writer discusses at length the "tried and untried means of avoiding a car famine," which appears with greater or less intensity every fall in Germany. The expedients ordinarily resorted to have been, urging shippers to lay in stocks of coal and other heavy freights, which can easily be kept a long time before using during the dull season; carriage

shop includes: One Tretheway 2,000-lb. steam hammer, double; one set No. 6 Hilles & Jones power bending rolls; one No. 600 Hilles & Jones combined punch and shears, 25-in. throat; one No. 4 Hilles & Jones plate planer, to plane 18 ft.; one No. 4 Hilles & Jones plate bending rolls, 12 ft. 2 in. between housings; one No. 1 Hilles & Jones combined punch and shears, 20-in. throat; one No. 3 Hilles & Jones combined punch and shears, 30-in. throat; one No. 2 Hilles & Jones horizontal flange punch, 8-in. throat; one Pond radial drill press, 6 ft.; one Pond back geared, self-feed press, 32 in.; one Hartz flue welder; one Oliver Bros. & Phillips' bolt header and furnace; one No. 3 B. G. Sturtevant & Co.'s blower; one Gisholt automatic tool grinder; one Bradley 80-lb. helve hammer, cushioned. In the tin and copper department there is a full complement of tools and machines for working sheet iron copper and tin.

Tests of Axles.

The following tests of iron car axles for the Chicago, Burlington & Quincy were made at the shops of the United States Rolling Stock Co., at Anniston, Ala., Nov. 3, last, the drop weight weighing 1,640 lbs., and the supports being fixed 3 ft. apart (centres).

FIRST AXLE.					
No. of blow.	Height of drop. Ft.	Deflection. In.	No. of blow.	Height of drop. Ft.	Deflection. In.
1	15	2	13	20	1 1/2
2	15	1 1/2	14	20	1 1/2
3	15	1 1/2	15	20	1 1/2
4	20	1 1/2	16	20	1 1/2
5	20	1 1/2	17	20	1 1/2
6	20	1 1/2	18	20	1 1/2
7	20	1 1/2	19	20	1 1/2
8	20	1 1/2	20	20	1 1/2
9	20	1 1/2	21	20	1 1/2
10	20	1 1/2	22	20	1 1/2
11	20	1 1/2	23	20	1 1/2
12	20	1 1/2			No fracture.

SECOND AXLE.					
No. of blow.	Height of drop. Ft.	Deflection. In.	No. of blow.	Height of drop. Ft.	Deflection. In.
1	15	1 1/2	4	20	1 1/2
2	15	1 1/2	5	20	1 1/2
3	15	1 1/2			No fracture.

THIRD AXLE.					
No. of blow.	Height of drop. Ft.	Deflection. In.	No. of blow.	Height of drop. Ft.	Deflection. In.
1	15	2	4	20	1 1/2
2	15	3/4	5	20	1 1/2
3	15	1 1/2			No fracture.

FOURTH AXLE.					
No. of blow.	Height of drop. Ft.	Deflection. In.	No. of blow.	Height of drop. Ft.	Deflection. In.
1	15	2 1/4	4	20	1 1/2
2	15	3/4	5	20	1 1/2
3	15	1 1/2			No fracture.

FIFTH AXLE.					
No. of blow.	Height of drop. Ft.	Deflection. In.	No. of blow.	Height of drop. Ft.	Deflection. In.
1	15	2 1/2	4	20	1 1/2
2	15	1 1/2	5	20	1 1/2
3	15	1 1/2			No fracture.

Three axles (4 1/2 in. diameter at centre) were required to be subjected to the following test without a fracture, viz., a 1,640 lb. weight dropped from a height of 15 ft three times in succession; and then a 1,640-lb. weight dropped from a height of 20 ft. twice in succession.

TECHNICAL.

Manufacturing and Business.

A. W. Ward is organizing a company at Charleston, W. Va., to control a self oiling car wheel flange and self locking nut for which he has recently received patents.

The Duluth blast furnace was put in operation last week and will run on Bessemer steel pig at the start and will soon increase its capacity to 140 tons daily.

The Phoenix Foundry & Machine Works, situated at Pinkney street and the Belt Line in Omaha, is about to increase its plant by the addition of works for making car wheels, axles, etc. For the present the capacity of the works will not exceed 20 car wheels a day.

The Wabash Railroad has let additional contracts for burning between 25,000 and 50,000 yards of burnt clay ballast to the Western Burnt Clay Ballast & Raving Co. of Cameron, Mo. The same company is also burning clay at St. Peters, Mo., and the Davy Co. is burning between Norborne and Ferguson.

The American Continuous Draw Bar Co. has received much encouragement lately from the orders booked for the device. At the present time it is being applied to about 9,000 cars, of which the following is a partial list:

Seven hundred and ten cars Toledo, St. Louis & Kansas City; 50 Fowler refrigerator cars; 50 Kingan refrigerator cars; built by the Michigan Car Co., Detroit; 600 C. & E. L., by the Peninsular Car Works, Detroit; 500 Louisville, New Albany & Chicago; 400 Peoria, Decatur & Evansville, by Haskell & Barker Michigan City, Ind.; a number of cars for Illinois Steel Co.; 50 Kingan refrigerator cars, by the Terre Haute Car Works; 300 Illinois Central; 160 Union Refrigerator Transit Co.'s cars; a number of American Transit Co.'s cars, by the Mount Vernon Car Works; 500 Choctaw Coal & Railway Co., by the St. Charles Works; 500 Baltimore & Ohio Southwestern; 200 San Antonio & Aransas Pass, by the Pullman Palace Car Co.

Iron and Steel.

The Illinois Steel Co. has decided to dismantle its nail factory at Bay View, near Milwaukee. The machinery has been sold to the Hammond Nail Co., of Hammond, Ind., and the work of shipping it to that place has been commenced. The plant cost in 1883 upward of \$250,000, and it had a capacity of 1,200 kegs a day.

The Bellefonte Iron & Nail Co. (Limited) has suspended operations, with liabilities aggregating about \$302,000. The extensive plant of the company has been turned over to Ex-Gov. James A. Beaver, its President, for the benefit of creditors. An extension of three years has been granted, and it is thought the works will be able to resume operations before long.

The Cincinnati Iron Co. has filed articles of incorporation at Duluth, Minn. The capital stock is \$3,000,000. The incorporators are Lewis Prichard, Frank Woodman, A. E. Humphries, Charleston, W. Va.; John McKinley, James T. Hale, Duluth.

New Stations and Shops.

Mr. A. Ellison has completed a contract to build a station at Edgar, Ont., for the Michigan Central. He is building a new ice house, 40 x 200 ft., for the company at Windsor, Ont.

The boiler house, machine shop and blacksmith shop of the Baltimore & Ohio Railroad, near Baltimore, were destroyed by fire early in the morning of Dec. 6, causing a loss of about \$25,000, which is covered by insurance.

The Lake Erie & Western roundhouse in Sandusky, O., was totally destroyed by fire Dec. 2. The loss on the building is about \$5,000, and on three locomotives and tools about \$25,000.

The Norfolk & Western Railroad will erect machine shops at Lambert's Point, near Norfolk, Va., at once, and it is more than probable that in addition to the shops two piers and one warehouse, similar to those now at the point, will be constructed during the coming year.

The Louisville, Evansville & St. Louis Consolidated is having plans made for a new and substantial freight and passenger station on Broadway at the approach of the viaduct to St. Louis.

The Missouri, Kansas & Texas will erect at Nevada, Mo., a passenger station to cost \$20,000.

The Philadelphia & Reading Railroad is about to build a fine passenger station at Perkasie, on the North Penn branch near Philadelphia. The building is designed to cost about \$4,000. The architects are Wilson Bros. & Co., of Philadelphia.

The Cleveland, Cincinnati, Chicago & St. Louis has awarded the contract for building a 20-stall roundhouse at Bellefontaine, O., which will succeed Gallion as a divisional terminal next spring. The roundhouse will cost \$30,000.

The Canadian Pacific has recently completed a very handsome station at Ingersoll, Ont., at a total cost of \$7,000, of which \$4,400 was for the building. It is a handsome and substantial structure, 70 x 38 ft., built of Credit Valley Stone and Milton pressed brick, with stone foundation and slate roof. The architects were Darling & Curry, of Toronto.

The new station of the Michigan Central at Niles, Mich., is nearly ready for occupancy. It is built of red sandstone, and covered with a slate roof. The building is very handsome and quite artistic. It is arranged with the usual waiting rooms on the track side with the ticket office in the centre. In the rear there is a *porte cochère*. All the furnishings and equipment are much after the general style adopted in all the modern stations of this company. In addition to the building many improvements have been made in the surroundings. The ample grounds have been laid out in drives and walks, and the approaches to the viaduct which the company has built just west of the station, are terraced and sodded giving a very pretty effect. Niles is the junction of the main line and Michigan Air Line 90 miles from Chicago.

The company is also terracing and sodding all the cuts and fills along its right of way from Kalamazoo to Niles.

Plans have been completed and bids invited for a new transfer station at Wayne Junction, near Philadelphia, for the Reading Railroad Co. The building will cost from \$10,000 to \$15,000. Bids have also been invited for a new freight station in Camden, at Third and Mechanic streets. It will be of brick, one story high, and 100 by 41 ft. in dimensions. The Reading Railroad Co. last week opened its new freight station at the foot of Linden street, Camden, for traffic. The station building proper is a heavy frame structure, resting upon brick and stone piers, with an interior measurement of 150 x 30 ft. A covered platform 10 ft. wide surrounds the edifice upon all sides, while additional platforms extend 100 ft. east and 90 ft. west of the main structure. A trestle and coal dump are being erected.

The Steel Works' Club at Joliet.

Two years ago the Illinois Steel Co. started an experiment at Joliet in the form of a working men's club. Mr. W. R. Stirling, First Vice-president of the company, arranged a plan which, as shown by the report at the second annual meeting last week, has proved successful. Some of the work accomplished during the past year will be indicative of the result: 82,549 persons entered the club building last year. Eight thousand books were drawn from the library, and 800 new books have been added. Three hundred and ten pupils are enrolled in the school department, and 42 children in the kindergarten. Four thousand dollars was collected and disbursed for the Mutual Benefit Association. The membership is now 944. There is \$420 in the treasury. The library contains 2,000 books, and the monthly circulation is now about 600. There is a free kindergarten school for children of members. Short hand, penmanship and book-keeping, are taught at 50c. per month. The membership fee is \$2.00 per year. The club house contains a recital hall, lecture hall with grand piano, and art rooms containing quite a valuable collection of statuary, paintings, engravings and etchings. There are also a gymnasium, bowling alley, ball court, billiard room, and game room for chess, checkers, etc. The bath rooms are provided with 300 lockers. Altogether, the fittings of the club are quite in keeping with a modern athletic club. The club is under the management of a board of directors elected by the members. The rules of the club are purposely kept as few as possible. They forbid the use or sale of intoxicants, all gambling and all political and religious meetings. This club is understood to be the only institution of the kind in the world. It was originally started by the Joliet Steel Co. before the consolidation of the Illinois company. At the second annual meeting, which was attended by a large body of guests from Chicago last Saturday, Mr. W. R. Stirling presented an address which contained the following pertinent remarks: "Labor and capital, instead of being antagonistic, are parts of a harmonious whole, as the hand and brain are parts of the man. . . . Our environment is not what it should be, and we are responsible for it; therefore, it rests with us to raise ourselves above our stations in life."

Interlocking.

Within 91 consecutive hours, beginning Saturday evening, Nov. 21, the signal engineers of the National Switch & Signal Co. replaced the interlocking plant at Cranford, on the Central of New Jersey, taking out an old 26-lever machine, remodeling the tower, putting in a new machine of 28 working and 4 spare levers, renumbering all switches and other apparatus on the ground, and leaving everything in complete working order, not having delayed traffic a moment.

Asbestos Gaskets.

Copper gaskets, made of D-section, opening outward, and fitted with asbestos inside, are now put on the market by a German firm—Paul Lechler, of Stuttgart. The asbestos, by this arrangement, is protected from moisture, and the whole is said to serve its purpose as a packing ring excellently.

The Niagara Power Tunnel.

The total excavation to date is about 4,700 ft., leaving about 2,000 ft. to complete the work originally laid out.

Electric Mining Locomotives.

On Nov. 30 a test was made of an electric mining locomotive built by the Edison General Electric Co. for the Loyal Hauna Coal Co. The contract calls for capacity to deliver 360 tons of coal an hour at the bottom of the shaft; that is, to haul 30 cars from an average distance of 4,000 ft. every 15 minutes. Trains weighing 120 tons are to be hauled at a speed of about 7 1/2 miles an hour, and also to surmount grades of 4 per cent. The gauge is 3 ft. 8 in.

Defective Insulation.

The danger of improper insulation of the wires conveying high tension electric currents was well illustrated lately in Chicago, where a loss of \$350,000 was sustained by the Chicago Arc Light & Power Company on Washington street. The crossing of two wires set fire to the building.

The Atikokan Iron Range.

The Atikokan iron range is situated in the district of Rainy River, about 50 miles southwest of a point on the Canadian Pacific 100 miles west of Port Arthur, Ont. The ore is magnetite averaging about 65 per cent. metallic iron and carrying no titanium and but a trace of phosphorus. Diamond drill tests and surface explorations, carried on since last April by Mr. W. W. Russell, of Port Arthur, and others, have proven the deposits to be very great. The ore occurs in lens-shaped bodies in the vertical hornblende and chlorite schists. A Belgian company, the "La Société Générale pour favoriser l'Industrie Nationale" has about concluded terms of sale with the various mine owners, as detailed in another column, and if the transfer is finally arranged, the mines will be developed. Among other things, the representatives of the Belgian syndicate propose to build blast furnaces and rolling mills at or near Port Arthur as soon as they are fully satisfied of the quantity and quality of the ore.

Pintsch Gas in Chicago.

A recent issue of the *Chicago Times* contains an appreciative account of the way in which the recent introduction of gas on the cars of the Chicago & Northwestern is received, especially by the suburban residents. It is said that the company now has 150 cars lighted by the Pintsch gas and is increasing the number so lighted as rapidly as possible. The 80,000 or more people who live in the suburbs and do business in Chicago, and spend an hour or more each day traveling in and out, are said to be much gratified by the change, which, however, can as yet affect but a small part of them. One "prominent resident of Norwood Park" is reported to have said that his hour on the train is now the most enjoyable of the day instead of being, as it was, the most disagreeable. This ought to be a valuable hint to the elevated railroads of New York as well as to some of the surface lines doing suburban business.

A Test of the Westinghouse Steam Engine Governor.

A test was recently made of the reliability of the Westinghouse governor at the power-house of the Federal Street and Pleasant Valley Electric Street Railway. The engine used was a compound Westinghouse engine 18 and 30 in. diameter of cylinders and 16 in. stroke. A special speed instrument designed by Mr. C. F. Scott, of the Westinghouse Electric Co., was made use of, recording a variation of speed to one-hundredth of one per cent., at half second intervals. The instrument is provided with a centre to be inserted in the centre of engine shaft. This centre revolves a wooden drum of 25-in. circumference at the same speed of revolution as that of the engine. A belted screw feed moves an electro-magnet, the armature of which supports a pencil longitudinally along the circumferential face of the drum. The armature and supported pencil are operated by the use of a pendulum adjusted to beat at nearly the speed of the engine, and make an electric contact at its centre of motion. A wrapping of paper on the drum receives an impression or mark from the pencil, displaying when spread out a line of elongated dots at an angle to the edge of the paper, the inclination of the angle varying with the speed of engine. The paper is cross-ruled into squares so that each square in a horizontal direction represents an interval of one-half second of time and about two revolutions of the engine shaft, and each square in a vertical direction represents a change of speed of one per cent. By plotting variations in load coming upon the engine, a comparison of the speed variations with the load changes can be made. After the test it was found that with each change of load a variation of only one per cent. occurred beyond the point at which the speed of revolution should have settled, with a gradual working back to the proper position and revolution. The conclusions reached are quoted as follows: "The governor was perfectly free from obstructing devices; yet it is indicated plainly that adjustment did not even commence until the speed had changed considerably. However, this is not surprising when it is considered that it depends on this variation of speed for the force of adjustment. Indeed the record is not at all a bad one so far as centrifugal governors go, the extra momentary change of speed would never be noticed in the average service, but it would be wholly unfit for electric railway work."

An Ingot Weighing 45 Tonnes.

The first ingot of nickel steel to be used in the manufacture of armor plate for the United States navy was cast in the open-hearth department of the Bethlehem Iron Works on Saturday afternoon. The weight of the ingot is 90,000 lbs. It is 47 in. thick and 90 in. wide. The mold in which it was cast weighs 56 tons. This armor plate will be used on the "Maine," now building at the Brooklyn navy yard.

The "Portelectric" System.

The United States Portelectric Co., with a capital of \$5,000,000, has been incorporated in West Virginia. The following are the incorporators: Thomas L. James, ex-Postmaster-General; ex-Judge A. J. Dittenhoefer, John Straiton, Charles F. James, Percival Knauth, William James, John T. Williams, Colonel Heary Huss, Frank Lawton and Whipple V. Phillips. The company controls the electric system of transporting mail and express packages at high speed, which was recently put up and tested at Dorchester, Mass.

Tall Buildings in Chicago.

The building of tall structures in Chicago is increasing rather than otherwise. On a single day recently, permits were taken out for the erection of five skyscrapers, none of which are to be less than 16 stories, and representing an investment of over \$3,100,000. One of these, it is said, will be the largest and finest office structure yet planned for Chicago. It will occupy a prominent corner in the office district and will cost nearly a million. Notwithstanding the opposition to these methods of centralizing business interests there is a growing feeling among engineers and builders that the present form of steel construction is safer than lower buildings of brick and mortar.

Large Interlocking Plant in London.

The London & Northwestern Railway of England is carrying out an extensive enlargement of its Euston terminus in London, and has completed the widening of a portion of the entrance, which now gives it four independent lines of railroad from London to Crewe, a distance of 153 miles. These four lines connect with the platform lines and sidings of the terminus, and are signaled from a cabin, in which is the largest interlocking frame in the world. This interlocking apparatus, which has been constructed at the company's locomotive and engineering works at Crewe from the designs of Mr. F. W. Webb, M. I. C. E., the company's Chief Mechanical Engineer, contains 288 levers, and provision is made for no less than 25,000 locks. This company, for the working of its 1,800 miles, has over 1,400 signal cabins, containing apparatus for the interlocking and working of 16,000 signals and 15,000 switches, provided at a cost exceeding \$8,000,000, and involving an annual outlay of \$1,600,000.

Grant Locomotive Works.

The Grant Locomotive Works, Chicago, are rapidly approaching completion. All but the office buildings have been erected and the machinery is now being received. Mr. William H. Fenner, who was recently elected president, is now in charge, and is pushing the work as fast as possible, hoping to get started early next year. The capacity of the works will be 300 engines per year, and all modern appliances for construction will be used. The shop is well supplied with traveling cranes and is probably the best lighted locomotive shop in this country. It has been generally supposed that there was a large amount of old machinery being put into this plant, but this is not so. Most of the machinery is new, and there will probably be a larger percentage of new machinery in this shop when completed than in any other commercial locomotive shop in this country.

Compound Locomotives.

The Lehigh Valley compound, with the Dean patent starting gear, will be completed about Jan. 1, and then will commence some interesting comparisons between this engine and a Vaucain compound under the same conditions.

Building Whalebacks at Duluth.

The keel has been laid at Duluth, by the American Steel Barge Works, for the first of the American whalebacks, which will carry 140,000 bushels of wheat and draw 15 ft. of water. They will be 325 ft. long, 46 ft. beam, 20 ft. deep, and are to be built exclusively for the lake trade. They are for a mining syndicate, and will be the first large vessels built by the barge company not on its own account.

Contract for Harbor Works at Coatzacoalcas, Mexico.

The contract for the extensive harbor works at Coatzacoalcas, Mexico, has been approved by the Government. The object is to make a safe harbor at the northern end of the National Isthmus Railroad, which belongs to the Mexican Government. The harbor is about 130 miles southeast of Vera Cruz. The harbor works are built on the Eads jetty system, as at Tampico, and with the depth of the river at Coatzacoalcas the completion of the works will give Mexico a second fine port on the Gulf of Mexico. The contractors are required to submit plans to the department within four months and the construction must commence in eight months. A maximum depth of 28 ft. in the channel must be had within three years and a half and the whole works finished in five years and a half. Beside building the jetties the contractors must build a pier 500 metres long and offices for the Custom House, etc., at a cost not to exceed \$25,000. The price to be paid by the Government of Mexico is \$4,300,000, and the company furnishes a guarantee of \$200,000.

Steam and Magnets.

The influence of steam on magnets is the subject of an interesting note in the *Schweizerische Bauzeitung* in which reference is made to the researches of Strouhal and Barus. These have shown that with long continued heating in steam, magnets lose from 28 to 67 per cent. of their power. If, after this, the magnets are remagnetized and again exposed to the action of steam, only a very slight loss of magnetic power is found to take place. The experiments which have been made would seem to warrant the conclusion also that after such treatment a magnet is less liable to deterioration from mechanical vibration as well as heat. In one of the experiments, a short magnet was boiled in water for four hours. It was then magnetized and held in an atmosphere of steam for two hours more, after which its magnetic moment was measured. It was then subjected to 50 blows from a piece of wood, both transversely and longitudinally. Again measuring its magnetic moment, showed a loss of 500, and on repeating the hammering with the wooden bar the loss was 450 of the original moment. In view of all this, repeated steaming and magnetizing is recommended as a good means of securing permanent magnetism in pieces of hard steel.

THE SCRAP HEAP.**Notes.**

Nine passenger conductors of the Chicago, Milwaukee & St. Paul were discharged Nov. 30.

There was a small train robbery on the East Tennessee, Virginia & Georgia near Rome, Ga., on the night of Dec. 2.

A dispatch of Dec. 7 from Calcutta, India, states that 34 persons were killed in a collision of mail trains between Mooltan and Lahore.

The Massachusetts Railroad Commissioners are investigating the subject of pensions for railroad employes, and last week held a public hearing.

The lower house of the South Carolina Legislature has passed a bill requiring railroads to provide separate accommodations for white and colored passengers.

A fire in the Iron Ridge Tunnel on the Northern Pacific, 15 miles west of Helena, Mont., last week, destroyed a portion of the timber supports, and through trains have since had to be run via Butte.

A sleeping car porter running between New York and Auburn on the New York Central has been sent to prison for six months for stealing tickets. He confessed that his robberies had extended over a period of a year.

The Illinois Board of Railroad and Warehouse Commissioners have approved the application for interlocking at Auburn Junction, near Chicago, at the crossing of the Chicago & Western Indiana and the Wabash roads.

Three spans of a long bridge at Moncton, N. B., were blown down by a storm on Saturday last. The structure was 1,600 ft. long, and about half of it was destroyed. A bridge over the Missisquoi River in Buckshire, Vt., was blown into the river by the storm of Dec. 4.

The Supreme Court of Kansas, in the application of the State Railroad Commissioners for a mandamus compelling the Union Pacific to repair and relay with new rails the Kansas Central, where the road had become dangerous, decides that all details of the case must be heard by the court.

The Railroad Commissioners of North Carolina have issued a circular requiring railroads to post bulletins at telegraph stations announcing probable delays to passenger trains. Whenever there is a break in or obstruction on the road, passengers who are likely to be delayed by it must be notified.

There was a serious fire in the new office building adjoining the new trainshed of the Pennsylvania Railroad in Jersey City on the morning of Dec. 4, several rooms being burned out and about \$50,000 damage done. There seems to be a question whether a gas explosion or an exposed electric wire started the fire.

A press dispatch says that the Supreme Court of Missouri has decided in a case against the Missouri Pacific that the railroads must accept through traffic from connecting roads regardless of unsuitable car couplings. The decision seems to be, in effect, that a brakeman must be able to use any kind of a coupler and not claim the existence of unusual peril.

The conductors and trainmen of the Southern Pacific, in Texas, have presented an elaborate demand for increased wages, which they have persistently urged for several weeks, but the General Manager says that the wages are higher than those on any other road in that region and at last accounts the men seemed likely to withdraw their demand.

The appeal in the Counselman case, involving the right of a grand jury to compel a witness to give testimony which may indirectly result in criminalizing himself, is being heard by the United States Supreme Court this week. It will be remembered that this case arose in connection with the attempt of the Interstate Commerce Commission to secure evidence of illegal payment of rebates on freight shipments from Chicago several months ago. Counselman was accused of receiving rebates, but refused to testify.

Governor McKinney, of Virginia, who has just sent his message to the Legislature, has a chapter on the relations of the public to the railroads, in which he takes sensible views of the duties and responsibilities of both. He favors, however, the passage of a law requiring separate accommodations for white and colored passengers. There is a considerable sentiment in the state which has for some time demanded the establishment of a railroad commission of three members in place of the present single commissioner, and this proposition the Governor favors; but he reminds the legislators that the railroads should have the right of appeal to the courts. The Governor advocates the imposition of a license tax on dining and buffet cars similar to that upon hotels.

World's Fair Notes.

The Baltimore & Ohio Railroad has proposed a special exhibit for the Fair. It will show the progress of the development of the road from a tram car to a steam railroad. Major J. G. Pangborn will have this exhibit in charge.

McArthur Bros., the contractors of the grading, dredging and filling of the grounds, have nearly completed their work. Up to date they have handled 1,189,655 cubic yards. The cost of the work will amount to about \$450,000.

The town of Pullman will have on exhibition a model showing all buildings in that locality and the Pullman Palace Car Company's works. It will be in the form of a relief map 30 x 40 ft.

Foreign Notes.

Reports continue to come of crop failures and famine in India. In Madras the cotton crop has been lost. The laboring classes have begun to leave their homes and cattle are starving, but it is believed that the supply of grain in the district is sufficient to avoid famine. Reports from central and western Bengal point to short crops and high prices, although actual scarcity is not probable. It appears that rain-making experiments have been tried and failed. In Upper Burma relief work on a large scale must be carried on for months.

The crops in Egypt surpass those of last year, which were large. The cotton crop will probably be 10 per cent. greater. Receipts of cereals at Alexandria since April 1 are double those of last year in the same time. The railroads have carried this year a million and a half tons of merchandise against one million last year, and receipts have increased £200,000.

The first railroad in Sweden was opened in 1856. At the end of 1888, the total length of lines amounted to 1,778 kilometres (about 1,104 miles), and at the end of 1889 the figure had reached 6,599 kilometres (about 4,095 miles). Of this length, 2,512 kilometres belonged to the government, and 4,287 kilometres were under private control.

The Spanish government recently adopted a number of regulations calculated to secure greater safety in railroad travel. According to these, each car is to be provided with electric bells by which the guards can be summoned in case of need, and there are to be openings between the first and second class compartments to enable the passengers to communicate with one another. On the arrival of trains at stations, the gendarmes are to keep special watch over the sides of the trains away from the station platforms. First and second class cars are to be provided also with locks inside, and passengers, on request, are to be furnished with keys. The various railroad companies, finally, are requested to introduce a different type of car, enabling one to pass through a train inside, and it is recommended that ticket collection and inspection during the night be dis-

continued. There would seem to be reason for believing, however, that the whole of the regulations will remain a dead letter, as the influence of the railroad companies is thought to be sufficient to enable them to ignore whatever fails to meet their approval.

Passes in New England.

United States Senator Chandler, of New Hampshire, who has entered a complaint before the Interstate Commerce Commission against the Boston & Maine, publishes the following: "I have been allowed by the Commission to glance at the list of passes for 1890 furnished by the Boston & Maine. It is an astounding and melancholy spectacle. All classes of society are riding free over that railroad in the three States of Maine, New Hampshire and Massachusetts. The names of the highest officers in the state governments and of the lowest lobbyists around the state legislature are upon the list of slaves of the Boston & Maine. The highest officers in the executive and legislative branches of the United States Government (below the President) and the lowest tide-waiters in the customs service appear upon the roll of humiliation. Judges of the New Hampshire Supreme Court and of other courts are there. The fair sex is generously treated. Hundreds of good women figure in the list of recipients of the favor of Messrs. Jones, Sinclair and Furber. Above all, and more numerous than the others, are the names of the editors, writers and reporters on the newspapers, from Boston to Portland, without regard to politics. Democratic and Republican editors alike share the widespread donations of the Boston & Maine, while there even appears the name of the editor with his wife and children of a prohibition paper, for whom President Jones and Manager Furber seem to have some use.

The New Chicago Stockyards.

A deed was recorded this week in Chicago made by Ansel Oppenheimer, representing A. B. Stickney, to the Chicago National Stock Yards Co., of 600 acres, located in the extreme southwest part of that city. This completes the long talked of deal by which five small packers leave the old yards and seek more commodious quarters. The consideration was \$650,000.

The Year's Ship Building in Maine.

This has been an unusually quiet year in the Maine ship yards. S. H. Barbour, of Bangor, will build two small steamers the present winter; in the district of Bath the two iron cruisers building by the Bath Iron Works are well ready toward completion; the New England Company has under way a large steamer. The total number of vessels built in the State this year is as follows: Ships, 2; barks, 2; schooners, 77; sloops, 47; steamers, 4; barkentines, 3; total built, 134; total tonnage, 50,337.

Another Chicago Street Tunnel.

An ordinance has been introduced by the Chicago City Council for a subway under the river to connect the North and South boulevards. In connection with this it is proposed to widen Michigan avenue to 120 feet between curbs. There is a strong popular demand for this step, and probably the council will pass favorably upon it some time before the first of the year.

Loss of the Only Cow that Gave Milk.

The Rockport, Langdon & Northern Railroad has suspended business. This railroad is not much longer than its name. It runs from Rockport to Langdon, Mo., a distance of six miles. The rolling stock consists of an engine which once did service on the New York elevated and a car which might have been the pilot house of Noah's ark placed on wheels. The rolling stock has been reduced to ashes. A fire broke out in the roundhouse at Rockport Monday. The citizens succeeded in dragging the engine out of the house, but not until it had been burned so badly that it was useless. The building is an entire loss. The various Eastern traffic associations have been notified that through travel from New York to San Francisco over the R. I. & N. must be temporarily suspended. —*St. Louis Republic.*

The Self-Purification of Rivers.

In a recent address, delivered before the German Congress of Naturalists and Physicians, Prof. von Pettenkofer advanced the view, based upon exhaustive examinations of the water of the River Isar below Munich, that untreated sewage may with perfect safety be discharged into a stream if its volume is not more than 1/10th of the river water. The population of Munich is 280,000, and the putrescent organic matter carried off in the sewage from this city amounts to 7,458,000 kilos. In the course of a year, and yet at Ismaning, less than 5 miles below, no sewage contamination can be detected, and bacteriological investigations reveal no evidence of sewage matter at Freising, a distance of about 20 miles. It has been proved that purification is not accomplished by subsidence, as dredging brings up gravel free from sewage matter. Prof. von Pettenkofer ascribes the purifying action of rivers entirely to the oxygen dissolved in the water in a free state, or separated from organisms. Green algae and other chlorophyllous and even non-chlorophyllous provide large quantities of oxygen in this way, and hence should be carefully preserved. Waste from many kinds of manufacturing establishments destroy this aquatic vegetation, hence such refuse should be purified before being discharged into rivers which supply drinking water to towns below.

From the Annual Report of the Secretary of the Interior.

The act of Congress, approved Sept. 29, 1890, declaring forfeited unearned railroad lands, and ordering their restoration to the public domain, relieves from suspension many cases involving lands in railroad limits where a portion or all of the road was built, although out of time. The benefits resulting will redound to the settlers who long ago purchased their farms from railroad companies and are now cultivating the soil.

The amounts due from the aided railroads to the Government, Dec. 31, 1890, were as follows:

Union Pacific.....	\$51,761,298
Central Pacific.....	53,682,612
Sioux City and Pacific.....	3,654,622
Central Branch Union Pacific.....	3,114,171
Total.....	\$112,512,613

The Secretary refers to his previous report, of the bonded indebtedness of the Union Pacific and again urges that some policy should be adopted and declared by Congress, whether it be to extend the loan, which will mature within the next six years, or to sell the road, for it seems to be conceded on all sides that the company will not be able to pay the bonds at maturity.

The President of the Nicaragua Canal Company re-

ports that during the past year much progress was made in the actual work of construction. Many of the accessory works have been extended, and in some cases carried to completion. The railroad from the Atlantic port to the divide has been completed, equipped, and is now in operation for a distance of 11 miles. Machine shops have been enlarged and well provided for all work incidental to the construction of the canal. The jetty or breakwater to protect the harbor entrance on the Atlantic has been extended 1,000 ft. into the ocean, and a second breakwater against northerly storms has been commenced on the west side of the harbor. About 3,000 ft. of actual excavation along the canal has been made, forming a channel from 150 to 230 ft. wide and about 17 ft. deep.

Since the organization of the company 10,145 shares of the capital stock have been subscribed for at par, amounting to \$1,014,500. Receipts from other sources amount to \$27,216. The company has expended and issued for property, labor, materials and administration expenses \$803,340, in cash, and 27,800 shares of the full paid capital stock of the par value of \$2,780,000, and it is obligated for \$5,953,000 of its first mortgage bonds. It has also issued 180,000 shares of stock (par value \$18,000,000) in payment for concessionary rights, privileges, franchises and other property. The liabilities consist of the amounts still due under concessions granted, of the \$5,953,000 of bonds which are due the Nicaraguan Canal Construction Co. for labor and materials in construction of the canal, and of outstanding cash liabilities not to exceed \$30,000. It is gratifying to note that this short passage to some of the greatest commercial markets in the world will be ready by the time a demand for it becomes imperative.

South American Railroads.

A contract has been entered into between the Department of Antioquia, Colombia, and Messrs. Osborn Brothers for the construction of a narrow gauge railroad between Medellin and Amaga in that state. The section of country through which the new road is to run has rich mineral and agricultural wealth. The line will cross the Valle and Cauca railroads, which are now in operation. The government guarantees interest at the rate of 6 per cent. per annum on the cost of building the road.

How Graphite is Mined in Ceylon.

A description of the methods of plumbago, or graphite, mining in Ceylon, given in *Iron*, would indicate that the Ceylonese have a good deal to learn, and, considering the somewhat augmented price of graphite today, it might pay some enterprising Americans to take the matter in hand. The native drives a shaft until forced to stop by the inflow of water. He then drives galleries from the bottom of this shaft just above water level until the accumulation of gas in his unventilated tunnels renders it too dangerous for further progress. Then he stops upward to the surface. All the machinery used is of the rudest native workmanship, and in loss of time occasioned by it the miner's object of keeping the expenses down is often defeated. The mines are abandoned just at the point where, with proper appliances, they could become most remunerative.

LOCOMOTIVE BUILDING.

The Long Island road has let to the Baldwin Works an order for 10 engines.

The Pennsylvania & Northwestern Railroad has contracted with the Baldwin Locomotive Works for ten additional locomotives, to be used in handling the coal traffic of the line. All are to be of the consolidation type, and of the four-cylinder Vaucelain compound pattern. The line on which they are to work has maximum grades of 158 ft. to the mile and curves of 18 and 22 degrees.

CAR BUILDING.

The Beach Creek road is in the market for 500 cars.

The Lehigh Valley has asked for bids on 25 passenger cars.

The New York, Susquehanna & Western has issued specifications for 200 box and coal cars.

The Monongahela River Railroad has ordered 300 new coal cars, to be delivered before April 1 next.

The Baltimore & Ohio has ordered 500 coal cars for the exclusive use of mines in the Fairmont district in West Virginia.

The Louisville, St. Louis & Texas has given an order for 100 new freight cars to the Ohio Falls Car Co., of Jeffersonville, Ind.

The Chicago, St. Paul, Minneapolis & Omaha has ordered from the Barney & Smith Mfg. Co. one passenger and baggage car; two mail, passenger and baggage cars and one baggage car.

The Delaware, Lackawanna & Western has placed its order for 500 cars with the Jackson & Woodin Mfg. Co. A second 500 on which bids were asked will probably not be let at the present time.

The Ohio Falls Car Co. has received a contract from the Nashville, Chattanooga & St. Louis for building 10 passenger cars. The company also has the Cincinnati Southern order for 400 box cars of 60,000 lbs. capacity.

Osgood Bradley & Sons, at Worcester, Mass., have just received an order from the New York, New Haven & Hartford for 50 standard passenger cars. To be duplicates of the 50 cars built for the road by this firm earlier in the year.

The Delaware & Hudson Canal Co. has let a contract for 12 passenger cars to the Gilbert Car Co., of Troy, N. Y. The firm is now working on the recent order of the New York Central & Hudson River road for 60 passenger cars.

The Lehigh Valley has divided orders for 3,000 cars among the following firms: McKee, Fuller & Co., of Catasauqua, Pa., received a contract for 1,000 cars; the Jackson & Woodin Co., of Berwick, Pa., for 1,000 cars; Pardee Snyder & Co., of Watsonstown, Pa., for 500 cars, and the Buffalo Car Co., for 500 cars.

BRIDGE BUILDING.

Alexandria, Va.—The plans for the new bridge for the Washington & Arlington Railroad over the Potomac at the Three Sisters have been completed and submitted to the Secretary of War for his approval. The work of building the bridge will be commenced at once, as it is understood that all the funds needed have been secured.

Bridgeport, Ala.—Work is progressing rapidly on the Nashville, Chattanooga & St. Louis bridge across the Tennessee River at Bridgeport. The entire bridge across the east sluice is being rebuilt. That across the west one was rebuilt two years ago. The bridge is also being raised, and the draw has been placed in the center of the stream, being much longer than the old one. The draw will be completed soon, when work will be begun on the other spans.

Brookline, Mass.—Sealed proposals for building the Brookline Avenue bridge at the Brookline Avenue crossing of the Muddy River improvement near Aspinwall avenue for the park departments of the city of Boston and the town of Brookline were received this week.

Carthage, N. Y.—The new railroad bridge at Deer River has been completed. This is the last of the large iron bridges which the New York Central has built on the Rome, Watertown & Ogdensburg system.

Chatham, Va.—The County Board of Supervisors has awarded to the King Iron Bridge Co., of Cleveland, O., the contract to build an iron bridge across Sandy River, at a cost of \$2,240. Jordan L. Ingram & Son were awarded the contract to build a covered bridge across Sandy Creek at a cost of \$950.

Corning, N. Y.—The iron bridge on the New York Lake Erie & Western over the Chemung River between Corning and Painted Post is being replaced by a heavy steel bridge. The old one is too light for the present traffic.

Duluth, Red Wing & Southern.—It is proposed to survey a new location which will pass through Stillwater, Minn. Four lines have been surveyed, but all of them pass directly through Wisconsin from Superior to Red Wing.

Fort MacLeod, Alberta.—The approaches to the MacLeod railroad bridge across the Old Man River, N. W. T., were finished last week and the bridge opened for traffic.

Ironton, O.—The new Norfolk & Western Railroad bridge across the Ohio River, just above this city and near Kenova, W. Va., has been completed and trains will be running across within a few days.

Kenova, W. Va.—The Norfolk & Western bridge over the Ohio River at Kenova, which was begun in May, 1890, is completed. The bridge is of steel, having five spans, the abutments resting on solid rock. The foundation for the piers was at first made of concrete, but this was replaced by solid rock. The bridge proper is 176 ft. long. The approach to the bridge is an iron viaduct, which is about twice as long as the bridge.

Memphis, Tenn.—The Pennsylvania Steel Co.'s bid of \$8,047 for the iron superstructure of the Mill street bridge was the lowest bid. That of the McLellan Stone Co., \$1,092, was the lowest for the stone work.

Minneapolis, Minn.—The Great Northern has submitted a new proposition to the city of Minneapolis in the matter of the tracks in East Minneapolis. This proposition contemplates the bridging of the tracks without lowering the grade, the company to construct the bridges and the city to build the approaches.

New Brunswick, N. J.—The Freeholders' have decided to employ an engineer to plan a new bridge over the Raritan River, to cost about \$100,000.

New York City.—The stockholders of the New York & New Jersey Bridge Co. have confirmed the consolidation of the New York company with the New Jersey company. They also confirmed the building contract with the New York & New Jersey Construction Co. The consolidation agreement provides for the issue of \$5,000,000 in common stock, and \$5,000,000 in five per cent. bonds of the United Bridge Companies of New York & New Jersey. Engineer T. C. Clark of the bridge company has decided that five miles of storage tracks can be built under the New York approach of the bridge. The bridge will land at Seventy-second street in New York at a height of 150 ft. It will come down to near the natural level at Thirty-eighth street. Mr. Clark's plan is to suspend a set of tracks underneath and from the bridge all the way down to the station. The Secretary of the bridge company says he does not think there will be much difficulty in securing the immense amount of money which will be required to defray expenses.

The New York & South Brooklyn Ferry & Steam Transportation Co. proposes to build an elevated covered bridge from the 39th street (Brooklyn) ferry at Pier 1, East River, to the South Ferry terminus of the Manhattan Elevated road.

Ohio County, W. Va.—The County Commissioners of Ohio County, W. Va., will build four new highway bridges on the old National road within that county next spring. They will all be of steel and will be very substantial. The State of West Virginia at the last session of the legislature gave up all control of the Old National Highway to Ohio County, and there are no less than 12 new bridges needed along the 15 miles of the road. All of these will not be erected at once, but they will be replaced within the next few years. The old arch stone bridges that were considered such an important part of the National road in 1829 have nearly all succumbed to floods and the ravages of time and will not last more than a few years.

Philadelphia, Pa.—The Department of Public Works has awarded to the A. & P. Roberts Co., Pencoyd Iron Works, the contract for the iron superstructure of the Walnut street bridge, for the sum of \$92,883, the work to be done in six months. R. B. Malone & Co., of Lancaster, Pa., received the contracts for building abutments at Twenty-fourth and Thirty-second streets, and also for the masonry, etc., on the east side of the river, while the contract for work on the western approach to the bridge was awarded to I. H. Hathaway & Co.

Work has made considerable progress on the retaining walls for the Columbia Avenue bridge at Tenth street. The railroad will be crossed by an iron truss bridge having heavy stone abutments. Ninth street will also be bridged. The cost of the work is being borne entirely by the Philadelphia & Reading, in accordance with the terms of the terminal ordinance. Including the grading of the street, the bridge will cost between \$125,000 and \$150,000.

Bills have been introduced in the Common Council to construct bridges over the tracks of the Philadelphia & Reading Railroad, at Glenwood avenue and Sedgely avenue; to request the Director of Public Works to confer with the Philadelphia & Camden Ferry Co. relative to the construction of a bridge across Delaware avenue at

Market street; an ordinance to authorize the construction of a wooden bridge over Morris street and the Pennsylvania Railroad, in Twenty-second ward, and a petition for a bridge over the Schuylkill River at Point Breeze.

Pierce County, Wash.—The County Commissioners of Pierce County have had plans drawn for a strain beam bridge 80 ft. long and 16 ft. above water, to be constructed over the Big Mashel River, between Baker's and Buchanan's.

St. Louis, Mo.—The plans for the proposed new Twelfth street bridge, prepared by Mr. Carl Galyler, will soon be submitted to the Board of Public Improvements. The new bridge will be much longer than the present one. It will extend from Clark avenue to Chouteau avenue, 2,100 ft., and will be 6 ft. higher than the bridge now spanning the tracks. It will have a 30-ft. roadway and 10-ft. sidewalks. The bills providing the money for the bridge are now before the Assembly. The cost will be \$250,000, but the city now has no money for the purpose of building bridges. Half the cost of the structure will be for stone foundations and piers, and it is thought that the St. Louis Merchants' Terminal Railroad Association and the Union Station Street Railroad Co., now using the bridge, will build this part of the stone work.

Seattle, Wash.—The County Commissioners have awarded a contract for a bridge across Green River at Patton's place to the San Francisco Bridge Co. The successful bid was as follows: For the bridge proper, 140-ft. span, \$2,650; approach, 250 ft., \$2.25 per foot. Steel cylinder piers will support the bridge. The other bids were: Hoffman & Bates, three bids, \$2,400, \$2,950 and \$4,300. Flynn & Brockmark proposed \$1,400, with approaches at the rate of \$1.75 per ft. extra. Including approaches the Portland Bridge Building Co., \$2,900. Tacoma Bridge Co., \$1,372 and \$1,274 with additional expenses. Fred Brooks, \$1,375 and \$1,674.

Vernon, Tex.—The railroad bridge over the Pease River is being replaced by a substantial iron structure by the Ft. Worth & Denver City.

West Superior, Wis.—The City Council of West Superior has adopted a resolution ordering city engineer Banks to make a survey and prepare estimates for a foot and wagon bridge across the St. Louis River to West Duluth.

Wheeling, W. Va.—At a meeting of the Main Street Bridge Commission of the City of Wheeling, held last Friday, it was decided to extend for two months the time allowed to Paige, Carey & Co. for completing the stone bridge over Wheeling Creek at Main street. The bridge, which is to have a single stone arch span of 150 ft., was to have been completed last August a year ago, but the time has been extended from time to time on account of the creek being frequently at flood tide, making work impossible. The work is well along now, the abutments being completed and the false work for the arch being in place and some of the stone laid. The bridge will be a good piece of engineering when completed, and the contractors think they can have it in use in two more months.

The Wheeling & Bridge Terminal Railway Company is building a new six track bridge over Caldwell's run in the lower part of Wheeling, W. Va., to carry the tracks of the Baltimore & Ohio and Ohio River roads over the waterway. The bridge was made necessary by the change made by the Wheeling Bridge & Terminal Co. in straightening Caldwell's run for its own convenience further up. The bridge will be of steel with substantial stone abutments. Paige, Carey & Co., of Wheeling, are doing the work.

The Board of Directors of the Bridgeport Bridge Co., which is really only another corporate name for the Wheeling Bridge Co., the completion of whose two bridges was mentioned last week, have about decided to build a bridge across what is known as the back river, between Wheeling Island and Bridgeport, Ohio. Mr. Elwood Hughes, secretary of the company, said: "We have our plans in very good shape, but the matter has not yet gone beyond the preliminary stage, for it is our intention to close up the business matters connected with the two bridges recently opened before we begin upon the new one." The bridge contemplated will be a steel structure for a double track street railroad, and about 1,200 ft. long, exclusive of approaches, which will be of steel also, and almost as long as the bridge itself. Although the back river is not, strictly speaking, a navigable stream, it will require that the bridge be almost up to the height prescribed by the United States War Department. The character of the traffic it will bear will make it necessarily a very heavy structure.

Wilmington, Del.—The Board of Trade has by resolution declared in favor of the county building a new bridge across the Brandywine, at some site between Van Buren and Clayton streets.

Woodstock, N. B.—Mr. David Browne, C. E., of St. Stephen, N. B., one of the engineers employed to report on and construct the new government bridge to be built across the St. John River at Woodstock, says that quicksand and clay have been found at the site of the new bridge far worse than that known to exist where the old bridge now stands. The government will probably reconsider their decision with regard to the location of the bridge and make a survey from Shea's Point, where it will be 700 ft. shorter and where they can get a foundation that can be relied upon.

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

In Indiana the Supreme Court rules that a railroad, there being no special contract as to time, is not bound to ship live stock on the first train leaving after the animals have been delivered.

In Mississippi the Supreme Court holds that where a bill of lading stipulates against liability for negligence of connecting lines, the carrier is not responsible for delay in delivering goods in time for a particular market, where it is not shown that the delay occurred on its own line.

In South Carolina the Supreme Court rules that where a contract with a railroad company for furnishing ties provided that they should be accepted or rejected by the company's inspector, the burden of proof is on the company to show that ties, used by it without such inspection, were defective.

In the Federal Court it is ruled that where land used in connection with a ferry for wagons and passengers has been condemned by a railroad company for the purposes of its right of way, and for approaches for a railroad bridge, the erection of a bridge for wagons and foot passengers, in taking away patronage from the ferry,

imposes an additional servitude, and entitles the owner to additional compensation.⁴

In New Jersey the Court of Appeals rules that where condemnation proceedings are had under the general railroad law of New Jersey, the condemning company cannot tender and pay into court the amount of the award of the commissioners, and enter into possession of the lands sought until the owner shall have had reasonable time to take an appeal from the commissioners' report.⁵

In Florida the Supreme Court holds that a person having property adjacent to a railroad is not bound to keep his property in such a condition as to guard against the negligence of the railroad company, or to keep watch over it.⁶

In Indiana the Court of Appeals holds that a railroad is not liable for want of a fence at a place where a platted street in an incorporated town crosses its track, even though such street is only used by persons on foot.⁷

And in another case the same court rules that the statute which compels railroad companies to fence their roads "except where the road runs through unimproved and uncultivated land," does not relieve railroad companies from liability for cattle killed by their trains because of an absence of a fence, even though the unfenced portion of the road runs through unimproved and uncultivated land. In this case the plaintiff drove a herd of cattle along the railroad track to a highway, and thence to a point 64 yds. from the track, whereupon a train came along and frightened the cattle, which ran through some vacant land to the track at a point where it was unfenced, and were killed by the train. The court rules that the fact that the cattle had been previously driven on the track did not relieve the company from liability for its neglect to fence.⁸

In Florida it is laid down that a charge that railroad companies are required to furnish their locomotives with spark-arresters of the best mechanical invention and construction in general use at the time is not erroneous.⁹

The laws of Utah provide that the right of eminent domain may be exercised in behalf of "steam and horse railroads," and that all rights of way for such purposes may be crossed or intersected by any other right of way or improvement, and may be subjected to a limited use in common with the owner when necessary for the public benefit. The Supreme Court holds that such right may be exercised in behalf of electrical street railroads.¹⁰

In Missouri the Supreme Court rules that a connection of a mine with another railroad is a valuable property right, and where a railroad company condemns a right of way across defendant's lot in such a way as to separate his engine from his mining shaft, if necessary changes and readjustment of engine, shaft and other appliances rendered it necessary to change the railroad connection, or make a new one, the reasonable expense thereof should be allowed.¹¹

In New York it is laid down by the Supreme Court that the rule of damages in an action by an abutting owner against an elevated railroad company, which has constructed and operated its road in the street, which allows the loss of rental value, is inapplicable to the case of a corporation owner in occupancy, for a corporation cannot be subjected to personal inconvenience and discomfort, and the recovery in such case can only be had for additional expense incurred.¹²

The Supreme Court of Texas holds that one who purchases, subsequent to the occupation of a railroad, land which is entered upon without consent of the owner, and which had not been condemned to its use, is entitled on condemnation to the same compensation that the owner could have recovered had he continued in ownership.¹³

In a case in the Supreme Court of the United States a compress company was in the habit of receiving cotton at its sheds in L., and had a contract with defendant railroad company to transport it to its compress, which was across the river. By reason of defendant's delay to furnish transportation, cotton accumulated in the sheds, and the street adjacent thereto, and was destroyed by fire. The Supreme Court holds that the mere fact of such delay did not make defendant responsible to the owners or insurers of the cotton for its loss.¹⁴

Injuries to Passengers, Employees and Strangers.

The Supreme Court of Mississippi rules that a railroad is not liable for injuries to a passenger resulting from getting his feet wet on alighting from a train which is stopped, not at a station, but near a public road crossing, where there is no platform, but where it is usual for the train to stop, and where the ground is generally in good condition, though at the time of the alleged negligence it is wet from rains.¹⁵

In Minnesota the Supreme Court holds that where a person who has an opportunity to purchase a ticket boards the train without one, and pays the sum which the conductor demands as fare to his destination, and the conductor afterward discovers that this is less than the true fare, he may within a reasonable time require the passenger to pay the difference, and, if he refuses to do so, may put him off the train.¹⁶

In the Federal Court the plaintiff purchased a ticket for an extended journey, the latter part of which was over defendant's road. By mistake the agent punched the ticket so as to indicate that it expired on the day on which it was issued. The mistake was not discovered until she was on the first division of defendant's road, when the conductor, upon telegraphing to the head office, received orders to honor the ticket until further instructions. At the end of his division, when he left the train, he delivered her the telegram. The conductor of the next division, notwithstanding the telegram, and the evidence on the face of the ticket that it had been honored, telegraphed to the division superintendent and received no answer; and meanwhile, from time to time, for several hours, worried plaintiff by making remarks calculated to disturb her and make her realize the disadvantages of her situation, and showing a desire to be unduly familiar. Finally, about midnight, after she had been carried a great distance, he put her off the train. She had explained in her first conversation that she was far from home, her means were exhausted and she was not able to pay her fare. The Court rules that plaintiff was entitled to recover damages for the expulsion and ill treatment, in an action on the contract represented by the ticket.¹⁷

In Minnesota the Supreme Court rules that the mere fact that a switchman, when injured by the derailing of a switch engine, was riding on the front instead of the rear footboard of the engine, is no evidence of contributory negligence.¹⁸

The Supreme Court of Missouri rules that where a fireman is injured in a wreck caused by the track sinking by reason of a great accumulation of water, which could have been prevented by a sufficient outlet for it through the roadbed, and on previous occasions the track has been overflooded at the same point, there is evidence of negligence sufficient to sustain a verdict against the road.¹⁹

In Minnesota an employé in charge of a hand car, whose duty it was to return with it before night, stopped by the way, and spent the evening at neighboring saloons, and wrongfully delayed his return till it became too dark to observe freight cars, which had in the meantime been left standing on the track. The Supreme Court holds that he voluntarily took the risk of running his car in the darkness, and could not recover for injuries received in a collision with such freight cars.²⁰

In Kentucky the plaintiff was injured while coupling a moving train to a standing car loaded with timber projecting over the end thereof. He did not know that the car was thus improperly loaded, and his attention was necessarily directed toward the moving train, giving signals to slacken speed, so that he could make the coupling. Held, there was no contributory negligence, and the company was liable.²¹

In Louisiana there were platforms on the several sides of a depot. The one on the south side was used exclusively for freight, and the flooring had been taken up for repairs. There was a lamp north of the depot which threw a light along the platforms intended for passengers. The plaintiff was at the depot as a mere spectator. She went on the south side platform, fell through the opening, and was injured. The Supreme Court rules that the opening was not in the nature of a trap, and that the railroad company was not guilty of gross negligence equivalent to intentional mischief, and was not liable.²²

In the same state it is held that where a child under four years old is run over by an engine, the doctrine of contributory negligence does not apply, children of that age not being capable of prudence or rashness.²³

In Missouri the Supreme Court describes that, although a contract under which a railroad company furnishes to a quarry owner, on his own side track, cars for the transportation of stone, obliges it to see that the cars are provided with proper brakes, it is not liable to a servant of such quarry owner, who is not a party to the contract, and over whom it has no control, for injuries resulting to him from the company's breach of its contract with such owner.²⁴

In Kansas, as it approached the crossing of another railroad in a city of 5,000 inhabitants, a freight train stopped not to exceed a minute so as to block one of the principal streets of the city near a public school building. A boy seven years old tried to climb over the cars. He was not seen by the trainmen. The train started, and he was thrown off and injured. The jury found that the company was negligent, in that the trainmen knew that the crossing was frequented by children, and were not on the lookout. The Supreme Court holds that there was no evidence of negligence on the part of the company.²⁵

- ¹ Penn. Co. v. Clark, 23 N. E. Rep. 208.
² Mobile & O. R. Co. v. Francis, 9 South Rep. 508.
³ Draffin v. C. C. & C. R. Co. (S. C.), 13 S. E. 427.
⁴ Payne v. Kansas & A. V. R. Co., 46 Fed. Rep. 516.
⁵ Waite v. Port Reading Ry. Co., 22 Alt. Rep. 261.
⁶ Jacksonville, T. & K. W. Ry. Co. v. Peninsular Land Transp. & Mfg. Co. (Fla.), 9 So. 661.
⁷ O. & W. Ry. Co. v. Heady, 28 N. E. Rep. 212.
⁸ L. E. & St. L. R. Co. v. Hart, 28 N. E. Rep. 218.
⁹ Jacksonville, T. & K. W. Ry. Co. v. Peninsular Land Transp. & Mfg. Co., 9 South Rep. 661.
¹⁰ Ogden City Ry. Co. v. Ogden City, 25 Pac. Rep. 288.
¹¹ Chicago, S. F. & C. Ry. Co. v. McGrew, 15 S. W. Rep. 931.
¹² Am. Bank Note Co. v. New York El. R. Co., 13 N. Y. S. 626.
¹³ San Antonio & A. P. Ry. Co. v. Ruby, 15 S. W. Rep. 1,040.
¹⁴ St. L. & S. Ry. Co. v. Com. U. Ins. Co., 11 S. Ct. 554.
¹⁵ Ala. & V. Ry. Co. v. Stacey, 9 South Rep. 349.
¹⁶ Wardwell v. C. M. & St. P. Ry. Co., 49 N. W. Rep. 206.
¹⁷ Johnson v. No. Pac. Ry. Co., 46 F. 347.
¹⁸ James v. Nor. Pac. R. Co., 48 N. W. Rep. 783.
¹⁹ Stober v. St. Louis, L. M. & S. Ry. Co., 16 S. W. Rep. 591.
²⁰ Sliney v. Duluth & W. R. Co., 49 N. W. Rep. 187.
²¹ L. & N. R. Co. v. Robinson, 16 S. W. Rep. 707.
²² Burbank v. Ill. Cent. R. Co., 8 South Rep. 580.
²³ Hamilton v. Morgan's L. & T. R. & S. S. Co., 8 South Rep. 580.
²⁴ Roddy v. Mo. Pac. Ry. Co., 15 S. W. Rep. 1,112.
²⁵ A. T. & S. F. R. Co. v. Plaskett, 26 Pac. Rep. 401.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Lehigh Valley, quarterly, 1½ per cent., payable Jan. 15.
Manhattan (Elevated), quarterly, 1½ per cent., payable Jan. 2.

New York Central & Hudson River, 4 per cent. on the capital stock of the New York & Harlem, payable Jan. 2.

Pennsylvania & Northwestern, semi-annual, 2½ per cent., payable Jan. 9.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Addison & Pennsylvania, annual, 49 Broadway, New York City, Jan. 11.

Alabama Great Southern, special, Birmingham, Ala., Dec. 15.

Albany & Pantego, annual, Norfolk, Va., Jan. 18.

Arkansas & Louisiana, annual, Washington, Ark., Jan. 25.

Atlantic & Danville, annual, Portsmouth, Va., Dec. 15.

Bellaire, Zanesville & Cincinnati, annual, Woodsfield, O., Jan. 4.

Boston & Lowell, annual, Boston, Mass., Jan. 6.

Brooklyn Elevated, annual, 31 Sands street, Brooklyn, N. Y., Jan. 6.

Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 6.

Columbus, Hocking Valley & Toledo, annual, Columbus, O., Jan. 12.

Housatonic, annual, Bridgeport, Conn., Dec. 15.

Kings County (Elevated), annual, 348 Fulton street, Brooklyn, N. Y., Jan. 13.

Little Schuylkill, annual, 410 Walnut street, Philadelphia, Pa., Jan. 13.

Mine Hill & Schuylkill Haven, annual, 119 South Fourth street, Philadelphia, Pa., Jan. 11.

Nesquehoning Valley, annual, 226 South Third street, Philadelphia, Pa., Jan. 11.

New York, Ontario & Western, annual, 18 Exchange Place, New York City, Jan. 20.

North Pennsylvania, annual, 240 South Third street, Philadelphia, Pa., Jan. 13.

Norwich & Worcester, annual, Worcester, Mass., Jan. 13.

Philadelphia & Reading, annual, 227 South Fourth street, Philadelphia, Pa., Jan. 11.

Philadelphia, Wilmington & Baltimore, annual, Wilmington, Del., Jan. 11.

Pittsburgh & Lake Erie, annual, 77 Fourth avenue, Pittsburgh, Pa., Jan. 26.

Pittsburgh, McKeesport & Youghiogheny, annual, Pittsburgh, Pa., Jan. 26.

Richmond & West Point Terminal, annual, Richmond, Va., Dec. 18.

Rome, Watertown & Ogdensburg, annual, 96 Broadway, New York City, Dec. 28.

St. Louis, Vandalia & Terre Haute, annual, Greenville, Ill., Jan. 12.

Terre Haute & Indianapolis, annual, Terre Haute, Ind., Jan. 4.

Terre Haute & Logansport, annual, Terre Haute, Ind., Jan. 4.

Toledo & Ohio Central Extension, annual, Marietta, O., Jan. 11.

Utica & Black River, annual, Grand Central Station, New York City, Dec. 28.

Virginia Midland, annual, Alexandria, Va., Dec. 16.

Western & Atlantic, annual, Atlanta, Ga., Jan. 20.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* will hold regular meetings, commencing January, 1892, on the second Monday of each alternate month, at the United States Hotel, Beach street, Boston, Mass.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings at its rooms in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

Western Railway Club

Mr. Willard A. Smith, Chief of the Bureau of Transportation Exhibits of the World's Columbian Exposition, has extended an invitation to the Western Railway Club to visit the fair grounds at Jackson Park and view the work of construction now going on. The Executive Committee of the club have decided to accept the invitation, and arrangements have been made for visiting the grounds on Tuesday, Dec. 15, the date on which the next meeting was to be held, this excursion taking the place of the regular meeting. A special car will be attached to the Illinois Central train which leaves the Van Buren Street station, Chicago, at 2:15 p. m. The members will return to the city not later than 5 o'clock.

PERSONAL.

—Mr. John W. Green, General Manager of the Georgia road, is now in California on several months' leave of absence.

—Mr. Robert S. Ryan, a member of the firm of Gooch & Ryan, railroad contractors, of Staunton, Va., died in Bisc City last week of pneumonia.

—Mr. G. F. Copeland, Superintendent of the St. Paul & Duluth, has resigned and will be succeeded on Jan. 1 by E. L. Brown with the title of Master of Transportation.

—Col. Edward Smith has been elected President of the Central Vermont road, and of the Consolidated of Vermont, to succeed the late Gov. J. Gregory Smith. Col. Smith has been Second Vice-President of the company.

—Mr. W. M. Greene, formerly General Manager of the Cleveland, Cincinnati, Chicago & St. Louis, has become connected with the Griffin Wheel & Foundry Co. of Chicago.

—Mr. Frederick Doman, a large railroad contractor in the West, died at his home in Portage, Wis., last week. The most recent of his large contracts was on the Pittsburgh, Akron & Western Railroad.

—Mr. George H. Valliant, second Vice-President of the New York, Lake Erie & Western, has declined to serve as director and Vice-President of the Columbus & Hocking Coal & Iron Co., to which position he was recently elected.

—Mr. W. F. Carr, engineer of the Minneapolis Street Railroad, who has had charge of construction, has retired. During the time Mr. Carr was in charge there have been placed in successful operation 125 miles of electric railroad.

—Mr. P. J. Flynn, the Commissioner of the Colorado & Utah Traffic Association, has been chosen Chairman of the Colorado Passenger Association. He succeeds Mr. S. K. Hoopes, the General Passenger Agent of the Denver & Rio Grande.

—Mr. Jarvis N. Dunham, President of one of the Springfield insurance companies, and a director of the Boston & Albany, died suddenly in Pittsfield, Mass., Dec. 2. Mr. Dunham was 63 years old. He had been director of the Boston & Albany since 1870.

—It is officially announced that Mr. D. I. Roberts, at present Assistant General Passenger Agent at Chicago, will succeed Mr. W. C. Rinearson as General Passenger Agent of the New York, Lake Erie & Western. The appointment has already taken effect.

—Mr. John L. Mapes, who was a railroad engineer of some prominence in Maryland and Pennsylvania, died in Brooklyn, N. Y., last week. He had removed to that city from Philadelphia a few months ago and was at the time of his death engineer for the Dodge Coal Storage Co., of Philadelphia.

—Mr. L. Hart Selden, engineer of the Peninsula Division of the Chicago & Northwestern, died in Chicago, last week. Mr. Selden was one of the constructing engineers of the Erie & Pittsburgh and after its completion was engaged in constructing the road between Escanaba and Marquette and many other northwestern roads.

—Mr. R. F. Goodman, General Agent of the Erie, in Buffalo, lessee of the Buffalo Creek, has resigned, and will soon go to Chicago to engage in other business. Mr. Goodman has been connected with the Buffalo Creek road for eight years. He was its Superintendent until the road was leased by the Erie, and he then became General Agent.

—Mr. E. S. Washburn has been appointed Freight Traffic Manager of the Kansas City, Fort Scott & Memphis road, to succeed Mr. M. L. Sargent, who died in Memphis last week after a long illness. Mr. Washburn was for about two years Freight Traffic Manager of the Cleveland, Cincinnati, Chicago and St. Louis road, resigning early this year.

—The State Legislature of Virginia this week re-elected for another term as Railroad Commissioner, Mr. J. C. Hill. The question of a new railroad commission in Virginia with much enlarged powers is now one of the most debated of the political subjects, and the chances now seem to be that Commissioner Hill's term under the present law will be a short one.

—Mr. J. H. Agnew, Superintendent of the South Carolina road, has resigned that position, his resignation taking effect Dec. 10. Mr. Agnew was formerly Master Mechanic of the road and was appointed Superintendent about a year ago, succeeding Mr. H. O. Dunkle, Master of Transportation. He has been connected with the South Carolina road about two years.

—The New York *Sun*, which a few months ago discovered "the only" female train dispatcher in the country has now discovered another, and prints a portrait of Miss Etta E. Spencer, of Providence, R. I., dispatcher on the Providence Division of the New York & New England. Miss Spencer has held this position for nine years, and her superintendent speaks of her abilities in highly complimentary terms.

—Mr. W. A. Deuel, who has been Superintendent of the First Division of the Denver & Rio Grande, succeeds Mr. R. J. Duncan as General Superintendent of the Gulf Division of the Union Pacific. Mr. Deuel was for many years connected with the Union Pacific. Mr. W. D. Moore, formerly of the Grand Island Division of the Union Pacific, succeeds Mr. O. W. Winter as Superintendent of the Texas lines, with office at Fort Worth, Tex.

—Mr. William C. Allison, President of the Allison Mfg. Co., died at his home in Philadelphia, Nov. 30. Mr. Allison had been engaged in car building in Philadelphia since 1851. The firm was at first Murphy & Allison, the senior partner being John Murphy. On his death in 1866, Mr. Allison purchased his interest from the heirs. In 1868 the firm became W. C. Allison & Sons, and in 1881 a close corporation, the Allison Mfg. Co., was organized. The business of the firm has not been confined to car building but has included the manufacture of pipes, tubes, etc.

—Mr. Fred Burbank Whitney, Assistant General Freight Agent of the Union Pacific, died at Omaha Dec. 5. The immediate cause of death was an operation for ulceration of the bowels. Mr. Whitney had been in the service of the Union Pacific for a number of years. Prior to that he was connected with the Chicago, St.

Paul, Minneapolis & Omaha and resigned the position of Assistant General Freight Agent of that company to accept a similar position with the Union Pacific, at Portland, Or. Mr. Whitney was well known throughout the West and Northwest. He was only 36 years old at the time of his death.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—J. C. Conroy, late Traveling Engineer, has been appointed Division Master Mechanic, with headquarters at Pueblo, Col.

Attica & Freedom.—At a Directors' meeting of the Attica & Freedom Railroad, held in New York, Dec. 8, the following officers were elected: President, R. B. Ferris; Vice-President, August Stein, 60 Broadway, and Secretary and Treasurer, William Jay.

Boston & Maine.—At the annual meeting of the stockholders in Boston, Dec. 9, William C. Whitney and G. G. Havens, of New York; Joseph H. White, of Brookline, Mass., and Walter Hunnewell, of Boston, were elected directors in the place of Messrs. Sinclair, Sewall and Potter. The other members of the board were re-elected.

Burlington & Missouri River.—H. C. Nutt, Jr., has been appointed Assistant Superintendent of the Wyoming Division, with headquarters at Alliance, Neb.

Central Vermont.—At the adjourned meeting of the stockholders held this week these directors were chosen: F. C. Smith, St. Albans, Vt.; James R. Langdon, Berlin, N. H.; L. J. Seargeant, Montreal; B. P. Cheney, Boston; W. H. Bingham, Stowe; Robert Wright, Montreal, and B. B. Smalley, Burlington.

M. M. Reynolds, Auditor of the Mexican National, has recently resigned, to take a similar position on the Central Vermont, with headquarters at St. Albans, Vt.

Consolidated of Vermont.—The company has elected the following directors: F. C. Smith, James R. Langdon, L. J. Seargeant, B. P. Cheney, W. H. Bingham, John Bell and S. B. Smalley.

Delaware & Otsego.—At the annual meeting held this week S. W. Andrews, Albert Morris, G. D. B. Hasbrouck, J. H. Thompson, George I. Wilber, H. C. Soop, J. S. Kerr, Henry Davis, A. C. Lewis, Charles Bray, S. G. Dimmick, William B. Peters and M. S. Roberts were elected directors.

Denver & Rio Grande.—W. A. Deuel having resigned, J. J. Burns has been made Acting Superintendent of the first division, in addition to his duties as Superintendent of Transportation.

Florence (Ala.)—William J. Nelson has been recently elected General Manager of the Florence Railroad & Improvement Co., vice A. L. Ellett, resigned.

Kansas City, Fort Scott & Memphis.—E. R. Washburn, has been appointed Freight Traffic Manager of this system, with headquarters at Kansas City, Mo.

Louisville & Nashville.—Thomas Manney, Roadmaster of the Pensacola division of the Louisville & Nashville road, has been appointed Roadmaster on the Mobile and New Orleans division, to succeed M. L. Ansley, resigned.

Mexican National.—Gabriel Morton has been elected Second Vice-President, with office in the City of Mexico, and will assume the duties of the office Jan. 1. He will continue to discharge the duties of treasurer, the office being transferred from the City of New York to the City of Mexico. The title of the Resident Treasurer, City of Mexico, will be changed to that of Assistant Treasurer after Jan. 15. R. B. Keys had been appointed Auditor of this company, with office at the City of Mexico, to take effect Jan. 15, vice M. M. Reynolds, resigned.

Mobile & Montgomery.—At the annual meeting in Montgomery, Ala., last week, the following directors were elected: G. W. Craik, J. I. McKinney, Theodore Welch, J. B. Thompson, A. C. Danner, M. C. Burke, J. M. Falkner. The directors re-elected the following officers: President, G. W. Craik; Vice-President, A. C. Danner; Secretary, J. H. Ellis.

Norfolk, Albemarle & Atlanta.—B. P. Holland has been appointed Assistant Superintendent with office at Norfolk, Va., and Gen. V. D. Groner has been appointed General Agent at Norfolk.

Portland & Rochester.—The following directors were elected at the recent annual meeting: George P. Westcott, Nathan Webb, William L. Putnam, Chas. McCarthy, Jr., William G. Davis, Portland, Me.; James T. Furber, Great Falls, N. H.; Stephen J. Young, Brunswick, Me.; Joseph S. Ricker, Deering, Me.; Arthur Sewall, Bath, Me. The directors elected George P. Westcott, President; William H. Conante, Treasurer; Joseph W. Peters, Superintendent.

Richmond & Petersburg.—At the recent annual meeting in Richmond, Va., F. R. Scott was re-elected president, H. Walters vice-president, and the following directors were elected: W. T. Walters, H. Walters, B. F. Newcomer, W. G. Elliott and D. W. Lassiter.

Rockland, Rockport & Camden.—At the annual meeting in Rockland, Me., the old board of directors was re-elected, with the addition of Hon. A. D. Bird. Hon. Wm. T. Cobb was elected President, and Henry N. Pierce, Secretary.

St. Paul & Duluth.—George F. Copeland, Superintendent, has resigned, the resignation becoming effective Dec. 31. The office of Superintendent will be abolished and that of Master of Transportation established. E. L. Brown, Superintendent of Telegraph and Chief Train Dispatcher, will receive this new appointment, and his present duties will be assumed by J. R. Michaels.

Ulster & Delaware.—The annual meeting of the stock and income bondholders of the company was held in Rondout, N. Y., Dec. 8, and Edwin Young, R. C. Prunty, Joseph Cornell, C. C. Clark, W. A. Read, J. D. Layng, A. Van Santford, H. C. Soop, Davis Winne, T. C. Hornbeck, A. S. Staples, S. G. Dimmick and Horace G. Young were elected directors.

RAILROAD CONSTRUCTION.
Incorporations, Surveys, Etc.

Atikokan Iron Range.—At the next session of the Dominion Parliament application will be made for the usual subsidy of \$3,200 per mile, in aid of the construction of the line. The company was incorporated last

May to build a road to the iron mines in the Atikokan Range, near the Minnesota State line. Last winter a year ago Mr. W. W. Russell, C. E., located a line for a road from the Canadian Pacific to the mines. The route is extremely easy of construction, following the valley of the Seine River nearly all the way; there is no grade exceeding 1 per cent., and for fully half the distance the average cut or fill will not exceed 3 ft. Last October, writes Mr. Russell, Messrs. Macquet and Frézes, representing a very wealthy Belgian syndicate, "La Société Générale pour Favoriser l'Industrie Nationale," made a personal examination of the iron range, and the railroad route thereto, and were so fully satisfied that they immediately commenced negotiations with all the mine owners. These negotiations are now practically concluded, the basis being the construction of the railroad before the fall of 1893, and the thorough working of the mines on a royalty and with a fixed minimum output, in consideration of an interest received, and a guarantee of the carrying of all the ores extracted during 25 years.

Baltimore & Ohio.—The prospects now are that connection of the Grafton & Greenbrier road and the West Virginia Central & Pittsburgh will be joined at Bellington, W. Va., by Jan. 10. Work has been kept back considerably by several large stone culverts that had to be built before the grading could be carried across.

Baltimore, Richmond & Southern.—A bill has been introduced in the Virginia Senate to incorporate this company. The bill proposes to acquire the Virginia & Carolina and the Richmond & Chesapeake roads. The incorporators are John G. Slater, J. L. Barbour, Wither Jones, T. E. Roessle, Sidney T. Dudley, of Washington City; T. F. Miner, of Richmond; C. W. Turner, of Manchester. The bill provides that the road shall commence at a point on the Potomac river in King George County, through Westmoreland or Nuthumberland and other counties to Richmond, then through Chesterfield to Petersburg and on to the North Carolina line.

Birmingham, Columbus City & St. Louis.—This is the name of the company which has been organized to build the railroad from Scottsboro via Columbus City to Guntersville, Ala., and its engineers have commenced a survey. W. E. Baskette, of Chattanooga, Tenn., is President of the company.

Bishopville.—This company has applied to the South Carolina Legislature for authority to change its name to the South & North Carolina Railroad, and for authority to extend its road north and northwest to the North Carolina State line, and from Atkins south or southeast to a point on the Northeastern or Central Railroad of South Carolina.

Bristol, Elizabethton & North Carolina.—This company has put in a connection with the furnace tracks at Bristol, Tenn., and will receive the material for track-laying over the South Atlantic & Ohio R. R. connection. Track has been laid from the furnace to Main street, 1½ miles (in Virginia). A contract has been made with the Pennsylvania Steel Co. for 40 miles of rails, 10 of which have already been delivered at Bristol. Tracklaying will be pushed to Elizabethton, Tenn., at once, a distance of 25 miles. Two new Baldwin consolidation engines have been delivered at Bristol for use on this road.

Brookfield & Northern.—The engineers of the railroad, a proposed line from Springfield, Mo., north to a point on the Iowa Central, have reached Greenfield in Sullivan County, Mo., and propose to make Ottumwa the northern terminus. The proposition will be considered by the Industrial Exchange immediately, and probably an effort will be made to secure a subsidy for the road, and free right of way.

Canada Atlantic.—Ballasting on the Central Counties road, a 21-mile branch from Glen Robertson to Hawkesbury, Ont., has been completed, and the road is now ready to be formally transferred by the contractors to the company. It is a substantial piece of work, and will give railroad facilities to a fine section of farming country, besides connecting several important villages with the main line of the Canada Atlantic. The road will probably be opened this week.

Canadian Pacific.—A report has been published in some papers that a double track would be built by this company between Winnipeg and Fort William, at the head of Lake Superior. President Van Horne made the following statements, when asked what probably gave rise to the report. He said in part: There are two sections of the main line that we have been looking forward to double tracking at an early date, Carleton Place to Sudbury Junction, 295 miles, and Lake Superior to Winnipeg, 428 miles, over both of which the traffic is becoming very heavy and promises within a very few years to reach the limit of single track capacity. We have, therefore, been shaping our plans with a view to carrying out this work within four or five years if the business continues to increase, of which I have no doubt. The line from Carleton Place to Sudbury Junction has to carry, in addition to the main line traffic, the large traffic passing by way of Sault Ste. Marie, and the traffic of both the main line and Sault lines is increasing very rapidly, and in that section of the line we are already making provision for a double track by increasing the width of bridges, cuttings and embankments as we carry on our improvements. Between Carleton Place and Montreal we have two independent lines, which can be made to serve practically the same purpose as a double track.

Charleston, Batesburg & Western.—A bill has been introduced in the South Carolina Legislature incorporating this road, with John H. Huie, U. X. Gunter, T. J. Kernaghan, N. A. Bates, Andrew B. Watson, W. B. Plunkett, and L. D. Cullum as incorporators. The company is to build a road from Batesburg through Lexington, Aiken, Edgefield, and Newberry counties to a point on the Barnwell, Alston & Newberry road. The capital stock is \$100,000.

Charleston, Colleton & Berkeley.—A bill has been introduced in the South Carolina Legislature to charter this company, with Charles E. Kimball, of New York, A. Ames Howlett, of Syracuse, N. Y.; Clarence S. Nettles, S. J. Fregnall, of Charleston, and others, as incorporators. The company is authorized to build a road from Eutawville, on the Charleston, Sumter & Northern through the counties of Berkeley, Colleton and Charleston to the city of Charleston. Work is to commence within six months and be completed within 18 months after charter is obtained. The capital stock is to be \$12,000 per mile.

Chesterfield & Lancaster.—At a recent meeting of the Board of Directors of the company, which has been organized to build a railroad from Cheraw via Chesterfield C. H. to Lancaster, a committee was appointed to obtain a right of way and make such arrangements as may be

cure the building of the road. W. A. Evans, of Hornsboro, S. C., is one of the directors.

Cumming & Norcross.—New surveys have recently been begun between Norcross and Cumming, Ga., to secure data desired by a number of business men in Atlanta, Ga., who have become financially interested in the enterprise, and expect to arrange for the early construction of the line. It is proposed to build a road from a point on the Chattahoochee River near Norcross to Cumming, a distance of about 20 miles, the route being on a ridge all the way and crossing no river except the Chattahoochee. The site for the bridge over that river is a good one, requiring a bridge 400 ft. long with no trestling and very short approaches. About \$17,000 has been subscribed by the farmers along the route to aid the project and the free right of way for the entire line will also be given to the company building the road. It is estimated that the cost of constructing the road will be \$10,000. Capt. T. J. James and Hampton Heardon & Co., both of Atlanta, are the proposed contractors. Col. H. P. Bell, of Cumming, and Capt. A. T. Abbott, of Warsaw, are interested in the project.

Duluth, Pierre & Black Hills.—Sixty miles of the road at the Aberdeen end and 15 miles at the Pierre end have been completed, leaving 50 miles to be constructed before these cities are connected. The work on the Pierre end is very heavy, but the balance is mainly light prairie work. General Manager Ward, of the company, says there is about \$40,000 remaining in the treasury. In the spring the work of completing the grade will be begun. The Northern Pacific, with which this road will connect, it is understood, is behind the project, and will assist it in building from Pierre to the Black Hills.

Duluth, Red Wing & Southern.—The company has submitted a proposition to a meeting of business men of Stillwater, Minn., to have the road surveyed through Stillwater. Four surveys have been made, but these all run from Superior to Red Wing direct through Wisconsin. Citizens will not be asked to give a large bonus, but principally a guarantee of business.

Duluth, South Shore & Atlantic.—The company has decided. It is reported, to at once complete its line, which is nearly all graded, from a point north of Bessemer on its main line, along the range to Hurley, Mich., in the northern peninsula. The Newberry addition has nearly all been purchased for yards and a station site.

Duluth Terminal.—The following is the principal part of a letter addressed by President Hayes, of the St. Paul & Duluth, to S. A. Thompson, Secretary of the Duluth Chamber of Commerce: "I have had an interview with Mr. Oakes, President of the Northern Pacific, upon the subject of terminal matters in Duluth, and find that we agree upon the necessity of extending the privileges of the Union Depot Company to include a transfer or terminal company, so as to offer terminal facilities of every character to any road desiring to establish a terminal in Duluth, and to equalize switching charges. The basis proposed is to distribute fixed charges, interest and expenses among the companies using the facilities proportional to the use made. I consider that the project which your committee has had in view can be accomplished by this means. We are not prepared at present to take up the work of developing Minnesota Point, but that territory can be readily utilized by transferring cars in floats as is done in New York."

Duluth & Winnipeg.—This line has been completed to Deer River, 18 miles west of Grand Rapids, Minn., and the terminals have been transferred from La Prairie to that point.

Dutchess County.—The last track on this line near Poughkeepsie, N. Y., will probably be laid in a few days and the connection with the Poughkeepsie Bridge fully established by Jan. 1. The track has been laid to within two miles of Poughkeepsie, but there is some very difficult work on this section in the town limits. The road extends southeast of Poughkeepsie to a connection with the New York & New England at Hopewell Junction, a distance of 12 miles.

Eastern Extension.—It is stated that a contract has been signed with a new York firm to build a line seven miles in length from the eastern terminus of this road, near the Strait of Canso, to Port Whithaven, in the county of Guysboro, Nova Scotia.

Emporium & Rich Valley.—About eight miles of this road has been graded during the fall through Cameron County, Pennsylvania, to reach extensive timber lands owned by its projectors. The part of the road which is completed extends from Emporium on the Philadelphia & Erie to Big Run, Pa. The contractor for the grading is P. Fitzpatrick, of Emporium, Pa., and his men are now at work on the last two miles from Big Run to the county line.

Forest City & Sioux City.—This line, although completed in 1890 between Forest City and Gettysburg, S. Dak., has never been opened for operations. Arrangements with this end in view are now being made. A number of those interested in the road recently went over the line. Among the number were George H. Kiley, of Connecticut, President; C. H. Webb, of New York, Chairman of the Board of Directors, and J. J. S. Hassler, of Washington, General Manager.

Georgia, Carolina & Northern.—The tracklaying beyond Athens, Ga., toward Atlanta, has been completed to the Alcoa River, about 2½ miles from Lawrenceville. As soon as the 8½-ft. iron bridge over the river has been completed, the track will be laid into Lawrenceville. There are four or five iron bridges to be put in between Lawrenceville and Atlanta, and it is hardly probable that the road will be completed to that point before Feb. 1.

Grand Trunk.—Considerable construction work is being done on the Midland road north of Lindsay, Ont. The work of filling in the large trestle between Kinmont and Gelet, on the Victoria division, was completed last week. The trestle is 800 ft. long and 70 ft. high. An average of 150 carloads of earth a day was dumped into the chasm, and over 7,000 carloads were required to do the filling. The material was carried from a point about a mile south of the trestle. The other trestle near this will be filled early next summer, as will also the trestle on the "missing link," east of Omeene. The latter will also be a large job, as it is longer than the one on the Victoria line, though not so high.

Great Northern.—The bridge across the Red River near Halstad, Minn., has not yet been completed, and until it is erected the track cannot be laid on the branch, which is now nearly all graded between Halstad and Alton, N. Dak. The branch is practically completed with the exception of this bridge, which crosses the Red

River about a mile west of Halstad from the Minnesota to the North Dakota shore.

Hinton & New River.—The preliminary survey will probably be commenced this winter and some effort made to obtain the right of way. The company was chartered last October, and considerable progress has been made in the organization of the company and other preliminary matters. The survey will be made from a point near the mouth of the Greenbrier River, near Hinton, W. Va., up New River, and thence along East River to its mouth in Mercer County. J. H. Miller, of Hinton, is the President of the company.

Hunter's Run & State Belt.—Only a very small amount of track has been laid on the road this fall, although the work was started early in the fall. The rails have been laid for less than a mile, but a good part of the line between Pine Grove Furnace, Pa., and the slate quarries six miles distant has been completed. L. L. Bush, of Bird in Hand, Pa., is the contractor.

Kansas City & Independence Air Line.—Smith & Bradbury, of Kansas City, who had the contract for building this road, have completed all their work on the line within the last 20 days. The road is now practically ready for operation from the junction with the Belt road, in Kansas City, to Independence, a distance a little over 3½ miles.

Kansas City & Suburban Belt.—An extension of the line from Second and Grand avenue in Kansas City to Kaw Point will probably soon be under active construction. The contracts have already been let for building about 2½ miles of the new road. The Pencoed Bridge & Construction Co. has the contract for building the steel bridges.

Kingston, Smith's Falls & Ottawa.—C. F. Gilder-sleeve states that the route of this road will be from Ballantraine north through Washburn, Brewer's Mills, Seely's Bay, Morton, Elgin, Portland, Lombardy, to Smith's Falls, Ont., thence in an almost direct line through Montague and Nepean townships to Ottawa. The road will be built as soon as financial arrangements can be made.

La Salle & Bureau County.—The location of this line has been completed and the arrangements made for connecting with the track of the four roads which cross the County near La Salle. On account of the late day at which the location was completed it is not likely that any construction work will be attempted this season, but it is proposed to push the construction work in the spring.

Mexican Roads.—The government of Mexico has cancelled the concession granted to Gonzalo A. Esteva for the construction of two roads from Aguas Calientes to Guadalajara and Chamela, on the Pacific Coast, because of failure to comply with the conditions of the contract.

The concession held by Col. A. K. Owen for a railroad from Topolobampo to Presidio del Rio Grande, on the northern frontier, has also been forfeited.

Missouri, East Tennessee & Virginia.—One of the officers of this company, which has been organized by the Southern Iron Co., of Boston, to build the railroad lines projected by that company, writes that engineering parties are at present at work in eastern Tennessee on the field surveys of the road. It is proposed to build a road about 87 miles long, from a connection with the Chesapeake & Ohio in West Virginia near Middlesboro, Ky., to Nashville and to Perryville, Tenn. The headquarters of the company are at 951 Stock Exchange Building, Boston.

Missouri Southwestern.—This company has filed articles of association in Missouri. The object is to construct a standard gauge road from Bloomfield, in Stoddard County, in a southwesterly direction, and from a junction with the St. Louis Southwestern railroad, a distance of six miles. The capital stock is \$60,000. The stockholders are: M. P. Phelan, of Bloomfield; G. H. Crumb, W. S. Randall, A. H. Gleason, and J. R. Crumb, all of Poplar Bluff, Mo.

Mobile & Girard.—The contractors have been delayed in laying the track on the southern end of the Troy extension, but it is now expected that all the track will be laid by Jan. 1. The principal cause for the delay has been caused by the non delivery of the rails. The track is at present laid south of Troy for about 40 miles to a point beyond Theba, Ala., and it has been graded 10 miles further to the proposed terminus at River Falls, formerly called Saginaw. The terminus is at a series of rapids in the Conecuh and Patsilaga rivers and cotton and lumber mills and other factories have already been built at the town. The road will be operated by the Central of Georgia, but it was built by the Van Kirk Land & Construction Co., of Pensacola, Fla., for the land grant. The general contractors were Worthington, Elliott and De Bardeleben, of Birmingham, and the sub-contractor was R. C. Strother, of Troy, Ala. Two extensions of this line are proposed and have been partly surveyed. One is southwest to Brewton, on the Louisville & Nashville, and the second is in a more southerly direction to Pensacola. The latter line is intended to complete a new route between Baltimore and Pensacola and Mobile.

Nashville & Knoxville.—The contract was to be let this month for grading the last 12 miles of the section to Standing Rock, Tenn. The contract was let in June last for building six miles east of Cookeville, at that time the terminus of the line. This work has been completed and the track laid on six miles of the new road, the present terminus being at Allgood. The contractors were the King Brothers Construction Co., of Cookeville.

New River & Kanawha.—The contract for building the line through Fayette County from a point south of Charleston, W. Va., will probably be let in January next, the projectors expect. The line has been surveyed along Arbutle Creek for 3½ miles to a connection with the Chesapeake & Ohio.

New Roads.—The Terracina Phosphate Co. is grading 3½ miles of railroad to connect its mines near Bartow, Fla., with the Phosphoria branch of the South Florida road.

Paul Didier, of Pittsburgh, who has had charge of a survey between Wilmington and Southport, N. C., parallel to the survey of the Brunswick, Southern & Western, says that the surveys are about completed with the exception of a little work near Wilmington. Work will be commenced at an early day, and on coaling docks at Southport. Ample terminal facilities had already been secured both at Southport and Wilmington.

Norfolk & Western.—The company has recently placed orders for 15,000 tons of rails, part to be used in the completion of its Ohio extension, which the company

expects to have finished entirely by Aug. 1 next, and the remainder for short branches, sidings, etc.

Northern Pacific.—The company is about to put in a short piece of track at Meeker Junction, Wash., on the Cascade Division, in order to transfer cars from Seattle, Wash., to the overland trains. When the new connection is completed through cars can conveniently be run from Seattle to St. Paul.

Oxford Mountain.—S. W. Foster, Managing Director, has asked the Dominion Government to inspect the completed portion of the road, so that the company can run passenger trains. The road starts at Eastman, Que., on the Canadian Pacific, and extends to Kingsbury, 30 miles or less. It is completed and ready for operation as far as Lawrenceville.

Pennsylvania.—The company may, it is reported, build a new road to the Gettysburg battlefield, leaving the Frederick Division Railroad at Sill's Station, a short distance east of Littlestown. The road will be surveyed next week, and it is believed to be the intention of the company to have the road completed in time for next summer's excursions.

Philadelphia Northeastern Elevated.—Contracts for the construction of the entire roadway of the elevated railroad have been awarded, the work having been divided equally between the Phoenix Iron Company, of Phoenixville, Pa., and Cooper, Hewitt & Co., of the Trenton Iron Works, Trenton, N. J. No actual work of construction can be prosecuted until after March 1, 1892, because of the law prohibiting the tearing up of any highway between Dec. 1 and March 1. It has been decided to establish four stations to a mile, and the trains will make the time between each station in one and a half minutes.

Powellton & Pocahontas.—This company was chartered in West Virginia last Friday. The incorporators are Evan Powell, N. Johnson, A. M. Campbell, D. T. Evans, Geo. S. Couch and E. W. Knight. Of the capital stock, \$25,000 has been paid in. The line of road will be from the mouth of Armstrong's Creek, in the Great Kanawha Valley, from a junction with the Chesapeake & Ohio road, southeast through Fayette and McDowell counties to Elkhorn on the Norfolk & Western. Mr. Powell is said to represent an English company which has invested in coal mines at Powellton. Mr. Couch is president of the National Bank of Charleston. It is the intention to have the surveys of the line made by early spring if possible, and to begin work soon thereafter.

Rapid City, Missouri River & St. Paul.—A large force of men is at work on the roadbed at the Cheyenne River. A plat has been filed showing its line, as surveyed, and located between Rapid City and Pierre.

Rockaway Valley.—The officers of the road hardly expect to begin grading on the Morristown extension before March, and the recent destruction of the company's shops and other property may delay the work still further. The right of way has been secured between Mendham and Morristown, N. J., seven miles, but there is still \$10,000 more local aid to be subscribed, for the company feels warranted in undertaking the construction of the extension.

St. Lawrence & Adirondack.—The official inspection of the Canadian part of the new section of road, a stretch of 32 miles, running from Valleyfield, Que., to Malone, N. Y., has been completed by Mr. Thomas Ridout, Government Railroad Inspector, with Mr. E. J. Chamberlain, Manager, and G. A. Mountain, Chief Engineer, of the Canada Atlantic, and others. Satisfaction with the work was expressed by all interested, and the road will be in operation in a few weeks.

Seattle & Montana.—This branch of the Great Northern was formally opened Nov. 27, between Seattle, Wash., and New Westminster, B. C. A special excursion train under the auspices of the Seattle Chamber of Commerce took a large number of people through to New Westminster, crossing the Fraser River on a ferryboat. Public demonstrations were made at Fairhaven and other places along the route where stops were made.

Silver City & Northern.—The entire length of this road, which was built to reach the mines in Southwestern Mexico, near Silver City, has been completed, and it was opened for operation Dec. 1. Regular trains are now running from Hanover to a connection with the Atchison, Topeka & Santa Fe at Whitewater, N. Mex., a distance of 18 miles. The line has been in part operation since August. The general office of the company has been removed from Silver City to Colorado Springs, Colo.

South Carolina Road.—In the first few days of the session of the Legislature a great number of railroad bills were introduced, among them to incorporate the following companies: Catawba Falls, Southeast, West Shore Transportation Co., Charleston, Batesburg & Western, South & North Carolina and the Sumter, Lake City & Conway.

Southern Pacific.—Tracklaying will commence in a few days on the new line from Nahant to Crofton via Redlands, Cal., a distance of seven miles. The grading was commenced early in November by Beight & Crandall, of San Bernardino, Cal. This firm also has the contract for the tracklaying. There are some trestles and bridges on the line, but the aggregate of this work is very trifling in amount.

The reconstruction work on the line between Yuma and Adonde, Ariz., is not progressing as fast as was anticipated. The chief difficulty of the contractors is in being unable to keep in their employ for any time as large a number of laborers as they need. Grant Bros., of San Francisco, who have the contract for the grading, began work about a month ago with nearly a thousand men, but in a short time several hundred men had left the work. The new road will extend for about 20 miles on the south side of the Gila River, east from the Colorado River. The grade is light, nowhere exceeding one per cent., and there is no important bridge work. What there is is included in the contract of Grant Bros. The tracklaying will be done by the company's forces.

Ricker, Lee & Co., of Galveston, Tex., have completed their contract on the relocation of the line near the Pecos River, in Western Texas. The piers have been completed and some work begun on the iron superstructure of the long viaduct, which will be one of the longest and highest in this country. The construction of this viaduct will save an 11-mile detour now made by the road.

Staunton Belt.—About 2½ miles of railroad have been built for this line by the Staunton Development Co., connecting the Baltimore & Ohio, at a point near Staunton, Va., with the Chesapeake & Ohio line, about 1½ miles east of Staunton, and extending to various manufacturing establishments. The railroad has been built with maximum grades of three per cent. and maximum curves

of 11 degrees. All the track has been laid with 53 lb. rails and has been ballasted. There is one trestle on the line 400 ft. long and 25 ft. high. The contractors were Codwise & Allen, of Baltimore and Washington, D. C. C. R. French, of Staunton, Va., is Chief Engineer of the company.

Stuttgart & Arkansas River.—Work has been recently resumed on the extension southwest of De Witt, Ark. The contractor, Thomas H. Leslie, is now working near Leslie Centre, Ark., on the line between De Witt and Pendleton. The work now being done is in the direction of De Witt, but grading will soon be begun toward the Colorado River.

Tavares, Atlantic & Tampa.—E. L. Ferran, G. A. Aber and others are organizing this company to build a road from New Smyrna west to Orlando, Fla., crossing the St. John's River near St. Francis, through Seneca and Eustis to Tavares, and from thence to Mascotte.

Tionesta Valley.—Grading has recently begun at Wolf Run, Pa., for a branch which is to be extended for about two miles from the main line. The work is not under contract, but is being carried on by a small force of men under the officers of the company.

Tobique Valley.—The building of the first 14 miles of this road being completed, the company expects to put on the rolling stock at an early date and to run trains regularly thereafter. This will give the people of Victoria service from Perth to Red Rapids. It is also expected that work will commence early in the spring on the construction of the remaining 14 miles to Plaster Rock, N. B.

West Virginia & Pittsburgh.—Tracklaying on the Gauley extension of this road was commenced on last Thursday. Frank H. Blodgett has the contract for laying rails all the way to the Gauley River. The tracklayers commenced work at the junction south of Sutton, W. Va., which will be the construction headquarters until work is completed as far as the bridge over Elk River, below the mouth of Holly. It is not probable that the extension will be pushed further than that this winter. In the spring the work will be commenced on the track to Gauley River.

GENERAL RAILROAD NEWS.

Boston & Maine.—At the annual meeting in Boston this week a committee was appointed to investigate the lease of the Nashua & Rochester and Manchester & Lawrence roads, and ascertain in whose control the roads were prior to the lease, who were the principal beneficiaries, and whether the Boston & Maine paid more than the earning capacity of these roads. The same committee will investigate the lease of the Upper Coos and Knox & Lincoln railroads, which are leased to the Maine Central. The agreement of June 22, 1897, between the Boston & Maine, Boston & Lowell and Nashua & Lowell roads was formally approved.

Canadian Pacific.—The company reports gross earnings for October of \$1,012,502; operating expenses, \$1,033,837; and net earnings, \$378,665, an increase of \$152,231 compared with the same month of 1890. For the ten months ending Oct. 31, the gross earnings were \$10,295,202; operating expenses, \$10,153,750; and net profits, \$26,141,451, a gain of \$1,061,634 compared with the corresponding period of last year.

Central Vermont.—The stockholders of the company, at a special meeting at St. Albans this week, voted to ratify the action of the directors in a re-organizing for the consolidation of this company, the Consolidated Railroad Company of Vermont, the Vermont & Canada, and the Montpelier & White River, and for the merging of the stocks and properties of these companies into this company; also to ratify the action of the directors in taking an assignment of the lease of the New London Northern for 99 years, dated Oct. 17, 1891, from the Consolidated Railroad of Vermont, and assuming the obligations of the last company under that lease.

Charleston, Cincinnati & Chicago.—The original holders of the \$7,000,000 bonds of the railroad met at Johnson City, Tenn., on Friday of last week and agreed to an arrangement for the issue by the company of \$3,000,000 preferred stock, with which to pay off the present indebtedness of the road and to complete the line.

Danville & Mt. Morris.—The statement in this column last week that the company owns no equipment of its own was incorrect at the time it was published. A train has been running over the road since Monday of last week, and a second engine and eight more box cars will probably be delivered this week. These cars are for local service between Mt. Morris and Danville, and the connections with the Western New York & Pennsylvania and those to be made with Delaware, Lackawanna & Western give facilities for reaching Rochester.

Herkimer, Newport & Poland.—A certificate of the reincorporation of the railroad company was filed in the office of the Secretary of State at Albany, N. Y., this week. The reincorporated company has a capital of \$250,000, which is the amount of the capital stock of the narrow gauge line, and will operate as a standard gauge road between Herkimer and Poland, N. Y.

Indiana, Decatur & Western.—The Circuit Court at Indianapolis, on Dec. 6, appointed James Wildman Receiver of the road. The appointment was on the petition of the old First National Bank, and others represented by W. A. Ketchum and Henry Spann. The road let the case go by default.

Maine Central.—The annual report to the stockholders for the year ending Sept. 30, 1891, shows the gross earnings for 12 months of \$1,324,905; expenses were \$2,362,893; taxes, \$79,434; total, \$2,442,327. Net earnings from the business were \$1,322,577. The net results of the financial year just closed shows a surplus of \$17,691 after payment of all fixed charges and taxes, operating expenses and two semi-annual dividends of three per cent. each. While the fiscal year just closed has been one of financial prosperity the result shows a decrease in the net earnings when compared with the preceding year. This is attributable to a temporary depression of the lumber interest on the line, whereby shipments were lessened and the large decrease in the ice traffic, together with the business incident thereto, which in the preceding year was of unparalleled magnitude.

Missouri Pacific.—The following statement was made this week relative to the floating debt of the company: The floating debt of the system on Sept. 30 was \$4,500,000. This was reduced in October by surplus net earnings. The company has on hand a large amount of the securities of other companies not deposited as security for any collateral trust bonds. The company has on

hand \$1,000,000 of Iron Mountain five per cent. bonds, worth about \$850,000, and \$3,000,000 of Missouri Pacific five per cent. collateral trust bonds, worth about \$2,400,000, also 24,000 shares of express stock, worth at par \$2,400,000, and \$5,500,000 of Wabash debenture bonds, worth about \$2,500,000, making a total of \$7,830,000.

New York Central & Hudson River.—The gross earnings of the company and its leased lines for November, 1891, were \$4,040,987, against \$3,099,581 for the same month of last year, an increase of \$941,406. The earnings of the Rome, Watertown & Ogdensburg, \$317,609, are included in the 1891 statement.

New York, Lake Erie & Western.—The report of earnings and expenses for October, the first month of the new fiscal year, is as follows:

	1891.	1890.	Inc.
Gross earnings.....	\$2,891,289	\$2,712,757	\$178,532
Operating expenses.....	1,817,739	1,694,392	123,347
	\$1,073,550	\$1,018,365	\$55,185
Less proportions due to leased lines.....	219,975	217,014	2,961
Net earnings.....	\$797,575	\$771,331	\$26,244

Northern Pacific.—The approximate gross earnings for November, 1891, were \$3,030,053, against \$3,057,056 for the corresponding month of last year, a decrease of \$26,998. The mileage operated in 1891 was 5,223 miles.

Philadelphia & Sea Shore.—Chancellor McGill, of New Jersey, has ordered the sale of this road and the Tuckahoe & Cape May road by the Receiver, with 30 days notice. The project was that of Edwin B. Wood to build a road from Camden to Cape May. Two separate companies were formed, one to build the Philadelphia and Seashore section from Winslow Junction to Sea Isle City, and the other the Tuckahoe and Cape May, from Sea Isle City to Cape May. Bonds were issued, and it is claimed that bonds held by the Security Guarantee & Trust Co. were illegally issued. The Receiver for the Philadelphia & Seashore brought the action for the reason that the concern was bonded to pay for the construction of the other section. The Chancellor concluded that liquidation was the only way to arrive at a settlement.

Poughkeepsie Bridge Co.—Negotiations for the sale of the Poughkeepsie Bridge are practically concluded. The property is to be sold to three railroads, but details have not been arranged. It is understood that the sale will be to the New York & New England, New York Central and Boston & Maine roads. The transfer includes the Central New England & Western, with a bonded debt of \$2,500,000. The plan provides that the bridge bondholders are to receive \$4,000,000 of guaranteed 4 per cent. bonds in place of \$5,000,000 unsecured 6 per cent. bonds. The Central New England & Western bondholders to receive new bonds, while the Delaware & New England, owner of the capital stock of both the bridge and the Central New England, is to receive a part of \$1,300,000 advanced.

Richmond, Nicholasville, Irvine & Beattyville.—The suit in which John MacLead, of Louisville, was last week appointed Receiver, was brought in the United States Circuit Court at Louisville, the complainants being the Central Trust Co., of New York, trustees of the \$2,000,000 of bonds issued by the road; the Louisville Trust Co., which holds \$300,000 of the bonds; the Shiffler Bridge Co., of Pennsylvania, and D. Stanahan & Co., contractors. The Ohio Valley Improvement & Construction Co. is also involved, both as debtor to the bridge company and creditor of the railroad company. The road was projected as an extension of the Louisville Southern, and was built by the same construction company. The line is now in operation between Versailles and Irvine, Ky., and has been graded for 27 miles additional through Eastern Kentucky to near Beattyville.

Richmond & West Point Terminal.—The president and directors were re-elected at the annual meeting in Richmond this week. Whenever the special committee's plan shall have been adopted the stockholders will be requested to approve and ratify the same as well as hold an election for a permanent management. The president's report says: 'Securities and property are represented on the books of the company as costing in securities and cash the sum of \$90,670,898. The company has no floating indebtedness of any kind, and, other than its ordinary investment in stock, bonds and property, it has assets consisting of advances to companies controlled, bills receivable and cash, amounting to \$1,574,742. The total revenue is \$1,289,434; expenses, \$1,227,001; net revenue for the year, \$62,433; profit and loss account, balance to the credit of this account, Nov. 30, 1891, \$692,574; balance Nov. 30, 1891, \$755,507. Owing to the reduction in the dividends of the East Tennessee, Virginia & Georgia Railroad, the company lost \$263,406 of revenues. The lease of the Central of Georgia, to the Georgia Pacific and the contract between that company and the Richmond & Danville by which the latter assumes the operation of the Central Railroad, was an important step in the direction of consolidating the road. These lines earned last year, gross, \$23,307,417. The operating expenses were \$16,062,727. Net earnings, \$7,704,694. The surplus earnings of the entire system for the year ending June 30, 1891, \$2,513,007.

Saginaw, Tuscola & Huron.—The company has discarded a mortgage of \$200,000 given by the company, and also filed a trust deed or mortgage at Saginaw, Mich., for \$1,000,000 given to the Continental Trust Co., of New York, to secure five per cent. 30-year bonds for changing the gauge of the road, recently accomplished and for new equipment.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Dec. 9, 1891.

It is not likely that any agreement will be reached by the Western lines in regard to regulations for the issue of free transportation. Several important lines have not yet taken action. It will be remembered that the agreement made a year ago was abrogated soon after it took effect.

The Commissioners of the Western Traffic Association hold their next meeting Dec. 15.

The December meeting of the Western Passenger Association transacted but little business of importance beyond taking preliminary steps to revise rates from Texas to St. Paul and common points via Chicago. It was decided not to increase the baggage allowance on coin tickets.

The investigation of alleged violations of the Interstate Commerce Law, at Omaha, came to an untimely end for lack of evidence, and it is given out that the cases have been dropped.

The Chicago & Alton has made passenger rates from Kansas City to Washington, D. C., and Virginia points, based on a rate of \$3.50 above the rates from St. Louis.

The Atchison, Topeka & Santa Fe is fitting up 600 stock cars to carry corn.

The car famine appears to be getting worse daily, and all the lines are utilizing everything in the way of equipment that is safe to run, and even then they are to-day probably 3,000 cars behind their orders for corn and wheat. The Eastern roads are no better off, and some of the Western roads, which have been able to keep fairly up to their orders during the continuance of navigation, will now be blocked for want of terminal delivery facilities.

Chairman Finley has found the Chicago, Rock Island & Pacific guilty of a violation of the agreement of the Western Passenger Association in the act of its connection, the Burlington, Cedar Rapids & Northern in making excursion rates, not authorized by the association, from Cedar Rapids to Barnesville, O., in September last. The Iowa Central, an outside line, proposed making a reduced rate on Sept. 22, but at the solicitation of the other lines gave it up. The Burlington, Cedar Rapids & Northern ticketed a party on Sept. 24 and now pleads in extenuation that it had so far committed itself on the strength of the proposed action of the Iowa Central, that when it was found that the competitor had given up it was too late to withdraw the rate. In the decision the Chairman says: "To recognize that outside competition under the provisions of Article 9 may be met relatively or upon territorial proximities and upon dates other than those when it actually occurred, would be to jeopardize the entire fabric of the agreement."

Traffic Notes.

The passenger trains of the Chicago & Grand Trunk began running through the St. Clair Tunnel Dec. 6.

The Pennsylvania lines west of Pittsburgh will on Jan. 1 reduce local passenger fares for clergymen from 2 cents to 1½ cents a mile.

The Wabash and the Toledo, St. Louis & Kansas City accuse each other of cutting passenger rates from Toledo to Missouri River points and beyond.

The commercial organizations of Denver have taken steps to form a traffic association similar to those in Kansas City, St. Louis and elsewhere.

It is reported that the Fitchburg has complained to the Interstate Commerce Commission of the Boston & Albany, which is charged with selling second class tickets to Chicago at \$2.25 less than tariff rates.

The New York Central is to run a sleeping car through to San Francisco after Jan. 1. The cars will run via Omaha and it is said that between Chicago and the Missouri River the business will be divided between the several lines. The first car, starting Jan. 5, will go over the Chicago, Milwaukee & St. Paul.

The absorption of switching and cartage charges at Chicago which was begun by the Chicago & Grand Trunk and has been in force several weeks was considered at a meeting of the Joint Committee in New York last week, and a resolution to discontinue the practice, restoring former rates, was practically agreed to, but it does not appear that any change has yet been put into effect.

The Philadelphia merchants, after protracted importunities, have got the Pennsylvania and the Baltimore & Ohio to allow a stop-over at that city on limited tickets reading to New York, and they have great hopes of largely increasing their trade with Southern and Western merchants; but the only advantage gained seems to be a rebate of about 75 cents, which is the average difference between a limited and an unlimited ticket.

A reporter who has investigated the private stock car business has counted up the number of cars containing feeding and watering appliances now in use. He finds that the Chicago, Burlington & Quincy has 1,500 of these cars of its own, and refuses to use private stock cars west of the Missouri River. The Pennsylvania has 810, the Delaware, Lackawanna & Western 400, and the Grand Trunk 550 of these cars. It is said that the most important patents on appliances for feeding and watering cattle in cars have expired.

A suit in the State Court at Louisville, Ky., against the Louisville Car Service Association to test the legality of a demurrage charge of \$1 a day has been decided in favor of the roads, the judge delivering a long opinion. All the usual arguments about the reasonableness of the free time limit, the right of railroads to combine, the value of a car, etc., were fully considered. Decisions of Massachusetts courts were cited to show that it was legal to agree to regulate competition, and that in the case of a charge of \$2 a day for storage it was immaterial that the goods were stored in a car instead of the freight house.

Eastbound Shipments.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Dec. 5 amounted to 93,975 tons, against 76,843 tons during the preceding week, an increase of 17,132 tons, and against 77,336 tons during the corresponding week of 1890, an increase of 16,589 tons. The proportions carried by each road were:

	Wk. to Dec. 5.		Wk. to Nov. 28.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	10,059	10.7	10,673	14.0
Wabash.....	5,350	5.9	4,910	6.2
Lake Shore & Michigan South.....	13,431	14.5	10,568	13.8
Pitts., Ft. Wayne & Chicago.....	11,238	12.0	7,466	9.9
Pitts., Cin., Chicago & St. L.....	7,846	8.4	8,279	10.8
Baltimore & Ohio.....	5,890	6.3	5,273	6.6
Chicago & Grand Trunk.....	19,248	20.8	10,973	13.3
New York, Chic. & St. Louis.....	8,837	9.4	8,181	12.0
Chicago & Erie.....	11,291	12.0	9,505	12.4
Total.....	93,975	100.0	76,843	100.0

Of the above shipments 6,330 tons were flour, 48,541 tons grain, 3,533 tons millstuff, 7,110 tons cured meats, 9,740 tons dressed beef, 2,833 tons hides and 3,866 tons lumber. The three Vanderbilt lines carried 34.6 per cent. of all the business, and the two Pennsylvania lines 20.4 per cent.

The lake lines carried 33,983 tons, against 36,802 tons during the preceding week, a decrease of 16,819 tons.